Figures

Figure 2.0 Sediment sampling in HBHA Pond.

Figure 2.1 HBHA Pond 3.

Figure 2.2 Preparing to sample at Station SD-01, Aberjona River Upstream of Site.

Figure 2.3 A view of Station SD-02, South Pond.

Originals in color

Figure 2.4 Station SD-03, Phillips Pond

Originals in color.

Figure 4.2 Surface water sampling at Station SD-09, HBHA Wetland Pond.

Originals in color.

Figure 5.0 Filling sample container for sediment VOC analysis.

Originals in color.

Figure 8.0 Sampling benthic invertebrates for tissue analysis.

Originals in color.

Figure 9.0 Largemouth Bass from HBHA.


Figure 9.1 Dissecting a White Sucker.

Originals in color.

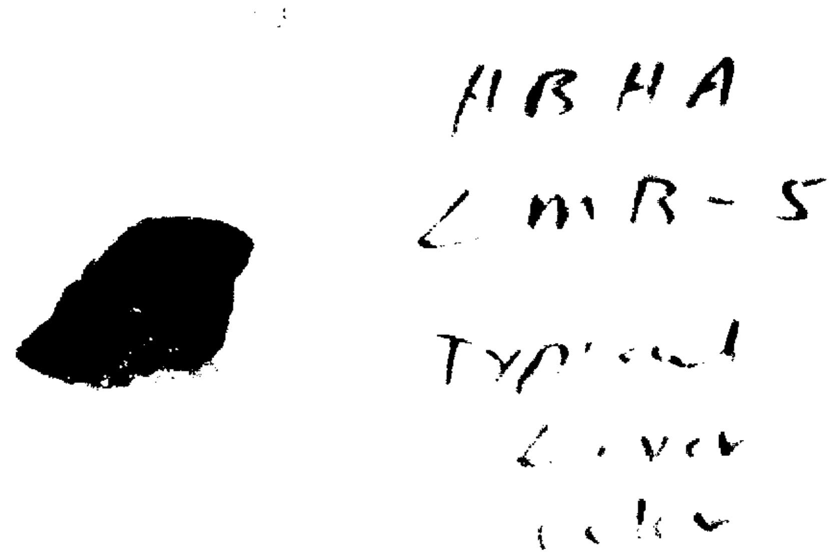

Figure 9.2 Normal largemouth bass liver, taken from HBHA.

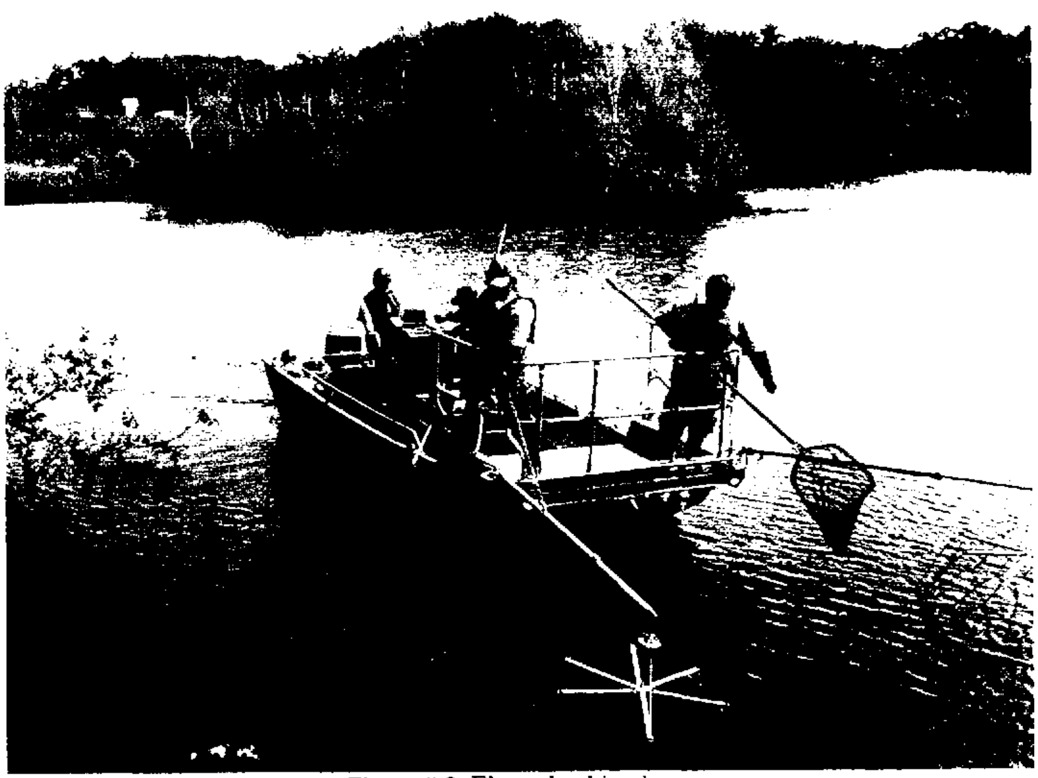

Figure 9.3 Electoshocking boat.

Originals in color.

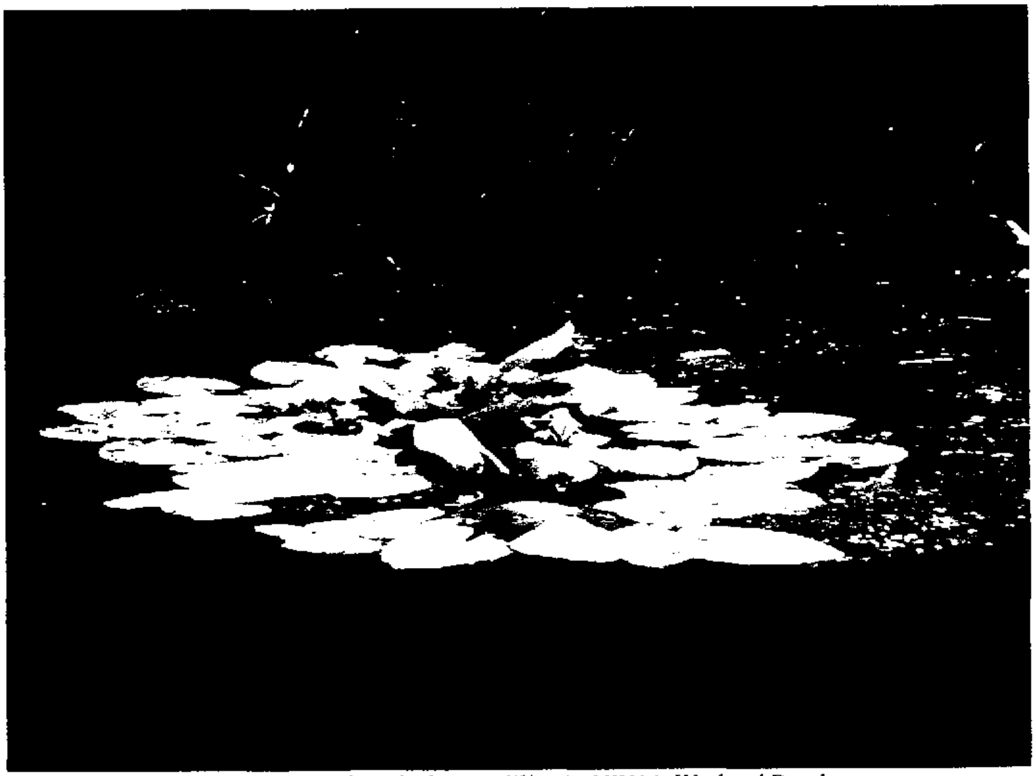

Figure 10.0 Stand of water lilies in HBHA Wetland Pond.

Originals in color.

Appendix A

Habitat Evaluation Forms

Low Gradient Stream Habitat Assessment Scores For Industriplex, Woburn, Massachusetts

Station:	SD-01	SD-02	SD-03	SD-04	SD-05	SD-06	SD-07	SD-08	SD-09	SD-10	SD-11	SD-12	SD-13
1. Epifaunal Substrate/ Available Cover	4	17	14	16	5	5	5	11	13	7	10	13	11
2. Pool Substrate Characterization	10	15	11	12	6	6	6	14	13	10	9	10	7
3. Pool Variability	4	NA	NA	6	NA	NA	NA	NA	5	NA	NA	5	12
4. Sediment Deposition	4	3	10	19	5	5	5	11	5	6	4	19	9
5. Channel Flow Status	3	18	17	9	17	17	17	16	7	8	13	16	6
6. Channel Alteration	20	13	13	14	3	3	3	16	18	17	9	14	7
7. Channel Sinuosity	10	5	4	14	2	2	2	4	8	3	7	17	13
8. Bank Stability (Left Bank)	9	9	9	9	7	7	7	9	9	9	9	8	9
Bank Stability (Right Bank)	9	9	9	9	7	7	7	9	9	9	9	8	9
9. Vegetative Protection (Left Bank)	10	6	7	10	6	6	6	6	7	7	7	9	8
Vegetative Protection (Right Bank)	10	6	7	10	6	6	6	6	7	7	7	9	8
10. Riparian Vegetative Zone Width (Left Bank)	10	5	3	10	2	2	2	5	8	8	3	10	8
Riparian Vegetative Zone Width (Right Bank)	10	5	3	10	2	2	2	5	8	8	3	10	8
TOTAL SCORE	113	111	107	148	68	68	68	112	117	99	90	148	115

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME S. branch Aberjona	LOCATION N. Reading
STATION # SD01 RIVERMILE 0	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY KTO	DATE ______ TIME ______ AM PM / REASON FOR SURVEY

Part + KO Conclusions

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 4	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization 10	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability 4	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition 4	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status 3	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration 20	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity 10	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME South Branch of Aberjona	LOCATION Woburn
STATION # SD-1 RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY Bart Hoskins	DATE ______ TIME ______ AM PM ; REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE ~~16~~ 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE ~~13~~ 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE ~~6~~ 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE ~~5~~ 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 10 ~~8~~	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
10/10 SCORE ~~8~~ (LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE ~~8~~ (RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
10 SCORE ~~9~~ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 ~~9~~ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME South Pond	LOCATION
STATION # SD-2 RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS CAM	
FORM COMPLETED BY CAM	DATE ______ TIME ______ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 17	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization 15	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability NA	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition 3	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status 18	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration 13	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity 5 ~~NA~~	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) 9	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. 6	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) 5	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME S. Pond	LOCATION I Plex Woburn
STATION # SD02 RIVERMILE ____	STREAM CLASS
LAT ____ LONG ____	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY KO	DATE ____ TIME ____ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability N/A	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition ?	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___(LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___(RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___(LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___(RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___(LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___(RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME South Pond	LOCATION
STATION # SD-2 RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY Bart Hoskins	DATE 6-21-99 TIME ______ AM PM — REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE NA	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity NA?	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 5	20 19 18 17 16	15 ~~14~~ 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
6/6 SCORE 4 (LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Phillips Pond	LOCATION Woburn
STATION # SD03 RIVERMILE	STREAM CLASS
LAT LONG	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY FO	DATE TIME AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability N/A	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Phillips Pond	LOCATION
STATION # SD-3 RIVERMILE	STREAM CLASS
LAT ___ LONG ___	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY	DATE ___ TIME ___ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 14	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization 11	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability NA	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition 10	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status 17	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration 13	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity 4	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) 9	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. 7	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Phillips Pond	LOCATION Woburn
STATION # SD63 RIVERMILE	STREAM CLASS
LAT LONG	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY FO	DATE TIME AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE N/A	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Hells Brook	LOCATION
STATION # SD - 4 RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY	DATE ______ AM PM / REASON FOR SURVEY

Habitat Parameter	Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Charlie Menzie

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score __________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME SD-04 Halls Brook	LOCATION	
STATION # SD-04 RIVERMILE ________	STREAM CLASS	
LAT ____________ LONG ____________	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY Bart Hoskins	DATE 6-17-99 AM PM	REASON FOR SURVEY

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover BH 16	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE ~~13~~	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization BH 12	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE ~~14~~	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability BH 6	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE ~~9~~	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition BH 9	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE ~~8~~	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Sinuosity SBH 14	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE ~~12~~	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. SBH 9	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) 10	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ~~8~~ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

reference locations

STREAM NAME Halls [illegible]	LOCATION
STATION # SD04 RIVERMILE	STREAM CLASS
LAT LONG	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY Path Tyler	DATE 6-16-99 TIME 12:45 AM PM REASON FOR SURVEY RI / FS

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 16	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization 12	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability 6	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration 19	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition 9	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Sinuosity 14	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status 14	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
9 **SCORE** 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
9 **SCORE** 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
10 **SCORE** 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
10 **SCORE** 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
10 **SCORE** 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
10 **SCORE** 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

right bank covered w reed canary grass + purple loosestrife

Alders, silky dogwood

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

right bank is less shaded

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME HBHA Pond	LOCATION
STATION # S-7 RIVERMILE	STREAM CLASS
LAT LONG	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY	DATE TIME AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 5	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. 5	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization 6	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability NA	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition 5	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status 17	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME HBHA Pond	LOCATION Woburn
STATION OD,567 RIVERMILE ______	STREAM CLASS Pond
LAT ______ LONG ______	RIVER BASIN
STORET#	AGENCY
INVESTIGATORS	
FORM COMPLETED BY KO	DATE ______ TIME ______ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE N/A	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___(LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___(RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___(LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE ___(RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___(LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___(RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME 18HB Pond	LOCATION
STATION # 505-7 RIVERMILE ________	STREAM CLASS
LAT ________ LONG ________	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY Bart Hoskins	DATE 6/22-6/23/95 TIME ______ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE N/A	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition w/ Bar development	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity N/A	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME HDHH Ave	LOCATION
STATION # SD 8 RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY	DATE ______ TIME ______ AM PM — REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover (11)	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization (14)	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability NA	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition (11)	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status (16)	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
	Condition Category			
6. Channel Alteration 16	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity 4	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability ~~(score each bank)~~ 9	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. 6	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) 5	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME HB	LOCATION
STATION # SDD8 RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY KO	DATE ______ TIME ______ AM PM — REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE N/A	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

digital is close

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME HBHA	LOCATION Woburn
STATION # SD09 RIVERMILE ____	STREAM CLASS
LAT ____ LONG ____	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY KD	DATE ____ TIME ____ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 13	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization 13	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability N/A	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition 5	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status 7	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Rat+ (9)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration 18	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity 8	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Halls Brook	LOCATION
STATION # SD-9 RIVERMILE ____	STREAM CLASS
LAT ____ LONG ____	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY Bart Hoskins	DATE ____ TIME ____ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 (LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Halls Brook	LOCATION Woburn
STATION # SD09 RIVERMILE ______	STREAM CLASS
LAT SD10 LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY KD	DATE ______ TIME ______ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 7	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization 10	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability 0 N/A	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition 6	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status 8	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration 17	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity 3	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 4 (LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Halls Brook	LOCATION	
STATION # SD-10 RIVERMILE ______	STREAM CLASS	
LAT ______ LONG ______	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY Bart Hoskins	DATE ______ TIME ______ AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE ~~NA~~ 0	20 19 18 17 16	15 14 13 12 11	10 9 8 ~~7~~ 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 8	20 ~~19~~ 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 (LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME HBHA Pond 3	LOCATION
STATION # SD-11 RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY	DATE ______ TIME ______ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover (10)	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization (9)	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability NA	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition (4)	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status 13	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration 9	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity 7	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) 9	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. 7	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME POND 3	LOCATION	
STATION # SD11 RIVERMILE ______	STREAM CLASS	
LAT ______ LONG ______	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY KO	DATE ______ TIME ______ AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 10	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization 9	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability Pond N/A	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition 4	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status 13	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration 9	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity 7	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ___________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Hills Brook	LOCATION
STATION # SD-1L RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY Charlie Menzie	DATE ______ AM PM / REASON FOR SURVEY

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are __not__ new fall and __not__ transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel: or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Halls Brook	LOCATION
STATION # SD12 RIVERMILE	STREAM CLASS
LAT LONG	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY KTB	DATE 6-17-96 1430 AM PM / REASON FOR SURVEY

Habitat Parameter	Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization (Augmented)	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
6. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME SD12	LOCATION Hall's Brook
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY Patti Tyler	DATE 6-17-99 ______ AM PM 1430 — REASON FOR SURVEY

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 13	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization 10	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability 5	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration 19	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition 16	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

16 rel
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Habitat Parameter	Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
6. Channel Sinuosity 14	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status 17	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
8 SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
8 SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
9 SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
9 SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 (LB) 10	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB) 10	Right Bank 10 9	8 7 6	5 4 3	2 1 0

no overstory
no shade
canopy
reed grass
cattails
on left bank

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

1930 hours
6-17-9

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Hall Brook	LOCATION
STATION # SD-12 RIVERMILE	STREAM CLASS
LAT LONG	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY Bart Hoskins	DATE 6-17-99 AM PM — REASON FOR SURVEY

Habitat Parameter	Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE ~~16~~ 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Aberjona	LOCATION Woburn
STATION # SDB RIVER MILE ________	STREAM CLASS
LAT ________ LONG ________	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY	DATE ________ TIME ________ AM PM / REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BAC

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___(LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___(RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___(LB)	Left Bank 10	8 7 6	5 4 3	2 1 0
SCORE ___(RB)	Right Bank 10	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___(LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___(RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME	LOCATION
STATION # 3D13 RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY	DATE 6/18/99 AM PM 9:45 / REASON FOR SURVEY

Habitat Parameter	Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover (11)	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization (7)	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability (12)	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration (9)	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition (13)	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Sinuosity 9	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ________

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Appendix B

Data Usability Reports

Data Usability Review
Metals Analyses
by EPA Methods 6010B (ICP), 7470A (CVAA), and 7000 series (GFAA)
EPA Region I Tier III – type review

Client: Menzie-Cura & Associates, Inc.

Site: Industri-Plex, Woburn, Massachusetts

Laboratory: Woods Hole Group Environmental Laboratory, Raynham, MA

SDG: Lab ETR #s: 42547, 42551, 42574 and 42575

# of samples/Analyses: 17 surface water samples for project-specific list of 19 total metals
17 surface water samples for project-specific list of 19 dissolved metals
2 rinsate blanks for total metals (associated with sediments)

Initial Reviewer: Susan D. Chapnick, New Environmental Horizons, Inc. S. Chapnick

Senior Reviewer: Dr. Nancy Rothman, New Environmental Horizons, Inc.

Date Completed: December 15, 1999

The Data Usability Review, representing a Region I Tier III-type validation, was performed on the data package. The intentions of this review are:

1. To determine if the data were generated and reported in accordance with the following:
   - EPA SW-846 Methods 6010B for ICP, 7471A for CVAA, and 7000 series for GFAA;
   - *Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts,* July 1999;
   - Region I, EPA-NE *Data Validation Functional Guidelines for Evaluating Environmental Analyses,* 12/96;
   - *Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses,* February 1989.
2. To determine if the data met the program data quality objectives for acceptable accuracy, precision, and sensitivity.
3. To determine and define the technical usability of the data based on the accuracy, precision, and sensitivity QA/QC indicators defined in the site QAPP.
4. To update the project database with appropriate data quality qualifiers.

The Data Usability Review consists of five sections. Section I is the Overall Summary of Data Usability including subsections addressing technical usability, accuracy, precision, representativeness, and sensitivity of the data. Sections II through V are hand-completed checklists: Section II - Data Package Completeness Review; Section III - Review of the Laboratory Data Summary Forms and Additional QA/QC Parameters; Section IV - Review of Overall Data Package Compliance; and Section V - Example Sample Calculations.

C. Technical Issues Affecting Precision and Representativeness - continued

Matrix duplicate precision could not be evaluated for 14 non-detected metals in the dissolved metals results including: aluminum, antimony, beryllium, cadmium, chromium, cobalt, copper, mercury, nickel, selenium, silver, thallium, vanadium, and zinc.

One field duplicate pair was included for each of the total and dissolved metals surface water samples: SD-02 and SD-02DUP. Field duplicate precision criteria were met for all detected total metals results and for all detected dissolved metals results with the exception of dissolved iron. The RPD for dissolved iron in the field duplicate pair was 121%. The two dissolved iron results in the field duplicate pair for dissolved metals were estimated (J) due to the observed imprecision. Evidence of poor precision in field duplicate results is an indication of heterogeneity. This may affect the representativeness of the dissolved iron results to the site location.

Field duplicate precision could not be evaluated for non-detected results in the total and dissolved metals surface water samples. Therefore, field duplicate precision could not be evaluated for 11 total metals results (antimony, beryllium, cadmium, chromium, cobalt, copper, mercury, selenium, silver, thallium, zinc) and 16 dissolved metals results (aluminum, antimony, arsenic, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, zinc).

D. Technical Issues Affecting Sensitivity

Blank contamination in method blanks, field rinsate blanks, and initial and continuing calibration blanks, along with an evaluation of the laboratory MDLs were reviewed to assess sensitivity of the results compared to QAPP-required reporting limits.

Sensitivity was acceptable for all surface water sample results compared to the project-specific reporting limits defined in Table 1-7 of the site QAPP (July 1999). Though all sample reporting limits met project requirements, low-level contamination of several metals was observed in the associated laboratory blank results for several total metals: aluminum, mercury, and zinc. Several total metals results for aluminum, mercury, and zinc that were less than the project reporting level and less than the blank action level were negated (qualified U) at the level found in the sample based on blank actions as follows:

- aluminum (total): SD-05DEEP, SD-06, SD-07DEEP, SD-07SHALLOW
- mercury (total): SD-01, SD-03DEEP, SD-07DEEP
- zinc (total): SD-03, SD-04

F. Summary of Completeness, Documentation, and Chain-of-Custody Issues

Chain-of-custody (COC) documentation of temperature on receipt at the laboratory was missing for several COCs. For samples received 6/21/99, a receipt temperature of 7°C was recorded. This exceeds the criterion of 4 ± 2 °C. The samples were collected in the summer and immediately sent via courier to the laboratory. Only surface water samples were collected associated with this COC. It appears that they did not have a chance to cool-down completely by the time they were received at the laboratory. No action was taken other than to note this discrepancy.

Indication of "sediment" or "surface water" for the association of the five-rinsate blanks was not made on the chain-of-custodies. However, personal communication with the sampler, Peter Kane of Woods Hole Group Environmental Laboratory, confirmed that the rinsate blanks were taken as rinses of the Eckman grab samplers used for sediment collection.

Times of sampling were not recorded on the chain-of-custody's for the sampling done on June 21 through June 23, 1999.

Sample aliquots for dissolved metals were filtered in the laboratory within 24 hours of collection except for samples SD-01, SD-02DUP, SD-08, SD-09, and SD-10 which were filtered within three to four days of collection. Samples were preserved immediately after filtration. Samples were maintained at 4 ± 2 °C.

NEH generated a data summary table based on the project data file supplied by the laboratory including the corrections and qualifications added to the data based on this Data Usability Review. The data summary table of technically valid and usable results for sediments reviewed by NEH is attached to this report.

Industri-Plex, Woburn, MA
Reference Locations -Total Metals Surface Water Data

Sample Location ID:		SD-04			SD-12		
Lab Sample ID:		42547-1			42547-3		
Date Sampled:	DV	06/17/1999	Lab	DV	06/17/1999	Lab	DV
Units	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte - Metals (Total)							
EPA Methods 6010B and 7000 series							
Aluminum, Total		102			202		
Antimony, Total	UJ [low]	18.3	U	UJ [low]	18.3	U	UJ [low]
Arsenic, Total	J [high]	1.1	BN	J [high]	1.8	BN	J [high]
Barium, Total		28			29.8		
Beryllium, Total	U	0.22	U	U	0.22	U	U
Cadmium, Total	U	0.78	U	U	0.78	U	U
Calcium, Total		26300			25800		
Chromium, Total	J	9	U	U	9	U	U
Cobalt, Total	J	3	U	U	3	U	U
Copper, Total	J	2.6		J	1.7	B	J
Iron, Total		1070			1110		
Lead, Total	J	4		J	5.6		
Magnesium, Total		4910			4710		
Manganese, Total		250			210		
Mercury, Total	U	0.04	U	U	0.04	U	U
Nickel, Total	J	1.3	B	J	1.2	U	U
Selenium, Total	U	1.6	B	J	1.1	U	U
Silver, Total	U	0.78	U	U	0.78	U	U
Thallium, Total	U	1.2	U	U	1.2	U	U
Vanadium, Total	J	2.6	U	U	2.6	U	U
Zinc, Total	B [high]	9	B	U	21.1		B [high]

DV Qual: U-Analyte was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Analytie was non-detected at estimated reporting limit. B-Analyte detected in associated blank.

Industri-Plex, W...urn, MA
Site Locations - Total Metals Surface Water Data

Validated 12/09/99; Revised 03/02/00
NEH, Inc.

Sample Location ID:	SD-08			SD-09			SD-10			SD-11			SD-13		
Lab Sample ID:	42575-1			42575-2			42574-4			42574-5			42547-4		
Date Sampled:	06/23/1999	Lab	DV	06/23/1999	Lab	DV	06/22/1999	Lab	DV	06/22/1999	Lab	DV	06/17/1999	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte - Metals (Total)			[Bias]			[Bias]			[Bias]			[Bias]			[Bias]
EPA Methods 6010B and 7000 series															
Aluminum, Total	176			200			111			84.8		B [high]	62.2		B [high]
Antimony, Total	18.3	U	UJ [low]	18.3	U	UJ [low]	18.3	U	UJ [low]	1.3	U	UJ [low]	18.3	U	UJ [low]
Arsenic, Total	29.2	N	J [high]	44.8	N	J [high]	26.8	N	J [high]	23.3	N	J [high]	26.7	N	J [high]
Barium, Total	31.3			34.9			29.5			31.3			43.4		
Beryllium, Total	0.22	U	U	0.22	U	U	0.22	U	U	0.22	U	U	0.22	U	U
Cadmium, Total	0.78	U	U	0.78	U	U	0.78	U	U	0.78	U	U	0.78	U	U
Calcium, Total	63600			61700			60900			60700			52400		
Chromium, Total	9	U	U	10		J	9	U	U	9	U	U	10.6		J
Cobalt, Total	3	U	U	3	U	U	3	U	U	3	U	U	3	U	U
Copper, Total	9.6			11.9			5.7		J	3.6		J	2.6		J
Iron, Total	1880			3650			2090			1930			2710		
Lead, Total	3.2		J	4.6		J	1.9		J	1.1		J	1.4		J
Magnesium, Total	8640			8570			8400			8460			8600		
Manganese, Total	593			707			578			696			749		
Mercury, Total	0.04	U	U	0.04	U	U	0.04	U	U	0.04	U	U	0.04	U	U
Nickel, Total	2.8	B	J	3	B	J	2.6	B	J	2.5	B	J	2.7	B	J
Selenium, Total	1.1	U	U	1.1	U	U	1.1	U	U	1.1	U	U	1.1	U	U
Silver, Total	0.78	U	U	0.78	U	U	0.78	U	U	0.78	U	U	0.78	U	U
Thallium, Total	1.2	U	U	1.2	U	U	1.2	U	U	1.2	U	U	1.2	U	U
Vanadium, Total	5.1	B	J	5.9	B	J	3.6	B	J	5.4	B	J	5.4	B	J
Zinc, Total	332			192			102			76.3			38.5		B [high]

U-Analyte was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to QC excedance. UJ-Analyte was non-detected at estimated reporting limit. B-Analyte was detected in associated blank. Bias-Indicated by QC.

Industri-Plex, Woburn, MA
Reference Locations -Dissolved Metals Surface Water Data

Validated 12/09/99; Revised 03/02/00
NEH, Inc.

Sample Location ID:	SD-04			SD-12		
Lab Sample ID:	42547-1			42547-3		
Date Sampled:	06/17/1999	Lab	DV	06/17/1999	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte - Metals (Dissolved)						
EPA Methods 6010B and 7000 series						
Aluminum, Dissolved	50	U	U	50	U	U
Antimony, Dissolved	100	U	U	100	U	U
Arsenic, Dissolved	2	U	U	2	U	U
Barium, Dissolved	24			24		
Beryllium, Dissolved	4	U	U	4	U	U
Cadmium, Dissolved	1	U	U	1	U	U
Calcium, Dissolved	26000			26000		
Chromium, Dissolved	10	U	U	10	U	U
Cobalt, Dissolved	3	U	U	3	U	U
Copper, Dissolved	2	U	U	2	U	U
Iron, Dissolved	310			240		
Lead, Dissolved	1	U	U	1		J
Magnesium, Dissolved	4900			4700		
Manganese, Dissolved	220			190		
Mercury, Dissolved	0.2	U	U	0.2	U	U
Nickel, Dissolved	2	U	U	2	U	U
Selenium, Dissolved	2	U	U	2	U	U
Silver, Dissolved	2	U	U	2	U	U
Thallium, Dissolved	2	U	U	2	U	U
Vanadium, Dissolved	10	U	U	10	U	U
Zinc, Dissolved	10	U	U	10	U	U

U-Analyte was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Analyte was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Dissolved Metals Surface Water Data

Sample Location ID:	SD-08			SD-09			SD-10			SD-11			SD-13		
Lab Sample ID:	42575-1			42575-2			42574-4			42574-5			42547-4		
Date Sampled:	06/23/1999	Lab	DV	06/23/1999	Lab	DV	06/22/1999	Lab	DV	06/22/1999	Lab	DV	06/17/1999	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte - Metals (Dissolved)															
EPA Methods 6010B and 7000 series															
Aluminum, Dissolved	50	U	U	50	U	U	50	U	U	50	U	U	50	U	U
Antimony, Dissolved	100	U	U	100	U	U	100	U	U	100	U	U	100	U	U
Arsenic, Dissolved	6			15			5			6			5		
Barium, Dissolved	27			32			28			28			38		
Beryllium, Dissolved	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Cadmium, Dissolved	1	U	U	1	U	U	1	U	U	1	U	U	1	U	U
Calcium, Dissolved	79000			80000			83000			79000			54000		
Chromium, Dissolved	10	U	U	10	U	U	10	U	U	10	U	U	10	U	U
Cobalt, Dissolved	3	U	U	3	U	U	3	U	U	3	U	U	3	U	U
Copper, Dissolved	4		J	4		J	3		J	2		J	2	U	U
Iron, Dissolved	160			1000			200			210			230		
Lead, Dissolved	1	U	U	1	U	U	1	U	U	1	U	U	1	U	U
Magnesium, Dissolved	8600			8500			8400			8500			8800		
Manganese, Dissolved	560			670			530			690			770		
Mercury, Dissolved	0.2	U	U	0.2	U	U	0.2	U	U	0.2	U	U	0.2	U	U
Nickel, Dissolved	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Selenium, Dissolved	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Silver, Dissolved	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Thallium, Dissolved	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Vanadium, Dissolved	10	U	U	10	U	U	10	U	U	10	U	U	10	U	U
Zinc, Dissolved	260			100			62			42			21		

U-Analyte was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance or uncertainty near the MDL. UJ-Analyte was non-detected at estimated reporting limit.

III. Review of CLP-Like Summary Forms and Additional QA/QC Parameters

A. Holding Times/Preservation Criteria

1. Were holding times/preservation criteria met for all samples/analyses as indicated below? **Yes / No.**

Metals	180 days from date of collection, preserved to pH < 2 and 4°C
Mercury	28 days from date of collection, preserved to pH < 2 and 4°C
Cyanide	14 days from date of collection, preserved to pH > 12 and 4°C
AVS/SEM	14 days from date of collection, kept at < 4°C

If no, list the affected samples/analytes and the number of days outside of the holding time or preservation issues in the table, below.

Actions: If the holding times were exceeded, estimate (J and UJ) positive and nondetect results. If the holding times were grossly exceeded, estimate (J) positive results and reject (R) nondetect results. If samples were improperly preserved, use professional judgment – may estimate (J and UJ) associated results.

Holding Time / Preservation Actions

Analyte	Holding Time Exceedance	Preservation Issue	Action / Bias	Affected Sample(s) / Comments

Sample aliquots for dissolved metals were filtered in the lab within 24 hr of collection except for SD-10, SD-01, SD-02DUP (collected 6/21 + filtered 6/25/99) and SD-08 + SD09 (collected 6/22 + filtered 6/25). Samples were preserved immediately after filtration

B. Calibration (continued)

2. Low Level Standard [Contract Required Detection Limit (CRDL)] Analysis

The Low Level Standard, or Contract Required Detection Limit (CRDL), is a direct measure of the instrument sensitivity near the detection limit.

a. Review Form 2B, Inorganic CRDL Standard for AA and ICP

b. Were the CRDL standards analyzed at the correct concentrations? **Yes / No.**

c. Did all CRDL standard results meet project or lab recovery criteria? **Yes / No.**

If no, list the samples/analytes affected and actions in the table, below.

Actions: If the CRDL recovery was greater than 150% (lab criteria), estimate (J) all positive results which were < 10x RL; no action is required for non-detects. If the CRDL recovery was less than 50% (lab criteria), estimate (J and UJ) positive and nondetect results <10x RL.

Low Level Standard (CRDL) Recovery Actions

Analyte	% Recovery CRDL Standard	Action / Bias	Affected Sample(s) / Comments
			NONE

C. Blank Results (continued)

2. Field Blank Results

Field blank results were reviewed to assess the presence of contaminants that ultimately affect the accuracy and sensitivity of the sample results.

a. Was there a field rinsate blank (RB) associated with the samples in this SDG? **Yes / No.** If yes, list the field blank(s) and the associated samples in the table below.

Field Rinsate Blank Sample ID	Associated Field Sample IDs
	NA

b. Were all analytes detected in the field blank(s) at levels less than the MDL? **~~Yes / No.~~** NA If no, list contaminants below.

NOTE: Use the maximum field blank concentration in cases where multiple field blanks are associated with the samples in a given SDG.

Field Blank ID: ______________________

Analyte	Field Blank Result (Units)

NA

No FB associated with surface water Samples

D. Matrix QC Results

1. Matrix Spike Recoveries

Matrix spike (MS) results were reviewed to assess the accuracy of the results relative to the specific sample matrix.

a. Review Form 5A, Spike Sample Recovery

b. Were matrix spike (MS) results present for all analytes at the proper frequency as required by the Site QAPP? **Yes / No.** Were matrix spike recovery criteria met for all analytes? **Yes / No.**

List the affected analytes and actions in the table below.

Actions: If the spike recovery was > 125%, estimate (J) all positive results. No action is taken for non-detects. If the spike recovery fell within the range of 30-74%, estimate (UJ or J) all sample results. If the spike recoveries were less than 30%, reject (R) the nondetect results as unusable and estimate (J) the positive results for extremely low bias.

If the sample concentration exceeds the spike-added concentration by a factor of 4 or more, no action is taken because the spike level was "swamped-out" by the native concentration in the sample.

Matrix Spike (MS) Accuracy Action Table MS performed on SD-3

Analyte	MS % Recovery	Action	Comments/Affected Samples
As- Total	129%	J	all arsenic, total results - potential high bias

D. Matrix QC Results (continued)

3. Field Duplicate Precision

Field duplicate sample results were reviewed to assess representativeness of the sample aliquot to the area sampled and the precision of the results relative to field sampling techniques.

a. Review Form 1, Inorganic Analysis Data Sheet, for the field duplicate sample analyses results.

Actions: If field duplicate precision exceeded criteria, below, for any analyte, estimate (J) positive results for the affected analytes in the field duplicate pair only. If severe imprecision was noted in the field duplicate results, qualify the remainder of the associated field sample data based on sound technical judgment.

Site QAPP Control Limits:	Waters	RPD < 30% for results > 5x RL difference ± RL for results < 5x RL
	Soils	RPD < 50% for results > 5x RL difference ±2x RL for results < 5x RL

Use professional judgment for results < 5x RL that do not meet the RPD criteria, above. [As guidance, Region 1 defines the following control limits: control limit of ± 2x CRDL for water and ± 4x CRDL for soil for results that are < 5x CRDL.]

Field Duplicate (FD) Precision/Representativeness Action Table SD-02
SD-02 DUP.

Analyte	FD RPD	Action	Comments/ Associated Samples
Total Metals:	all	detected	results met FD precision.
Could not	evaluate	for	ND results: Sb, Be, Cd, Cr, Co, Cu,
			Hg, Se, Ag, Tl, Zn
Dissolved Metals:		Met for	all detected results except iron:
Fe	121%	J	Both dissolved Fe results.
Could not	evaluate	for ND	results: Al, Sb, As, Be, Cd, Cr, Co, Cu, Pb,
			Hg, Ni, Se, Ag, Tl, V, Zn.

E. Method QC (continued)

2. ICP Method QC - ICP Interference Check Sample Results

ICP interference check procedures were performed to evaluate and verify the laboratory's interelement and background corrections for ICP analyses.

a. Review Form 4, ICP Interference Check Sample

b. Were analyte levels in the ICSA and ICSAB reported for all metals? **Yes / No**. Was the ICSA and ICSAB analyzed as the correct frequency as defined in SW846? **Yes / No**. Did all analytes meet recovery criteria of 80-120% in the ICSAB solution? **Yes / No**.

c. Were the absolute values of the reported results ~~for~~ analytes in the ICSA check solution, other than Al, Ca, Fe, and Mg, less than 2x RL? **Yes / No**. see below

d. Were the major interfering analytes (Al, Ca, Fe, and Mg) within linear range of the ICP instrument? **Yes / No.** If no, were appropriate dilutions made to bring the interferent within linear range? **Yes / No**. If no, evaluate interferences based on lab IECs and Linear Range analyses and describe any actions taken, based on professional judgment and calculations to estimate the level of interference, below.

e. Were other interfering analytes (Na) within linear range of the ICP? **Yes / No**. If no, evaluate potential physical interferences and take actions to estimate (J and UJ) affected analytes based on professional judgment. Include any actions below.

If no to any of the above, list the affected samples, analytes, concentrations and actions in the section below.

Comments:

QC
12/9/99

V ~~+ Zn~~ results in ICSA were > 2 x ~~MDL~~ RL.
No action taken as levels of interferents in samples did not exceed the levels in the ICS solutions (for Al, Ca, Fe, Mg). Therefore interelement interference not suspected.

F. Verification of IDLs, Linear Ranges, IECs

1. Instrument Detection Limits

Analyte detection limits were reviewed to assess if the sensitivity of the results met the project-specific requirements.

a. Review Form 10, or equivalent. For this project, Method Detection Limits (MDL) must be performed annually.

b. Were current (annual) MDLs present for all analytes and all instruments used for analysis? **Yes / No.**

c. Were the MDLs compliant with project-specific reporting limit requirements as listed in Table 1-7 of the Site QAPP? **Yes / No.**

Actions: If no, estimate (J or UJ) all affected results that are < 10X MDL due to the uncertainty in the level of detection. List any actions in the Comments section, below.

2. ICP Interelement Correction Factors

a. Review Form 11, or equivalent, ICP Interelement Correction Factors (Annually)

b. Were the current (annual) IECs present in the data package? **Yes / No.**

Actions: If no, use professional judgment to determine the severity of the affect on the results.

3. ICP Linear Ranges (Annual)

a. Review Form 12, or equivalent, ICP Linear Ranges are checked daily and updated, at a minimum, annually for this project.

b. Were current (annual) linear range data present in the data package? **Yes / No.**

Actions: If no, use professional judgment to determine the severity of the affect on the results.

If no to questions for Forms 10, 11, or 12, list the affected samples/analytes and actions in the comment section, below.

Comments:

Lead reported < MDL. Reported down to 1 ug/L + MDL is 1.2 ug/L. Demonstrated sensitivity by analysis of a low-level standard at 1 ug/L - acceptable recovery (90%).

H. Additional QA/QC Issues

1. Percent Solids

Percent solids data were reviewed to further assess the affect of the sample matrix on result quantitation.

a. Review percent solids results for all soil and sediment samples on the Form 1s. Note that for this project, all sediment samples were freeze-dried prior to analysis for total metals. The freeze-dried percent solids is used to calculate the total metals results on a dry-weight basis; therefore, the freeze-dried percent solids is used to compare to EPA Region I DV criteria. For AVS/SEM, the "as-received" percent solids is used as AVS is volatile and freeze-drying cannot be performed.

b. Were percent solids > 30% for all soil samples? **Yes / No.**

If no, list affected samples and actions in the table, below.

Actions: If percent solids results were > 30%, no actions are required. If percent solids were < 30% but > 10%, reject all non-detected results (R) and estimate (J) all detected results. If percent solids were <10%, reject (R) all results. Professional judgment may be used to modify these actions. For example, AVS/SEM must be analyzed on the "as received" sediment without the freeze-drying preparation because AVS is volatile and may be lost upon freeze-drying. AVS/SEM data will not be rejected due to low percent solids because the molar ratio information is useful to the ecological risk assessors even in low percent solids sediments. The data may be estimated (J and UJ) based on professional judgment.

Percent Solids Action Table

Sample ID	% Solids	Action / Comments

NA

Waters only

IV ~~III~~. Review of Overall Data Package Compliance

Review of the overall data package was performed to determine if the laboratory met all EPA SW846 method and project QAPP requirements.

A. Case Narrative Review

1. Review the Case Narrative provided with the data package and list all issues of noncompliance or QA/QC exceedances addressed in the case narrative that have not been previously evaluated in the Data Usability Review. For each issue listed, state what qualification to the data has been taken.

Comments:

No further issues.

V. ~~IV~~. Review of One Sample

The review of one sample per fraction for each data package was performed to determine if sample results and quantitation limits were correctly calculated and reported.

Sample ID SD-01 was selected for review in this data package. Total Metals. Lab ID# 42574-3

A. Detection / Reporting Limit Review

Reproduce the sample detection limit for one analyte for each method (ICP, GFAA, CVAA, and cyanide). Did the laboratory correctly calculate the detection limits? Yes No. If no, list below the affected analytes.

NONE

List in the table below any results that did not meet reporting limits requirements as listed in the Site QAPP, Table 1-7.

Results That Do Not Meet QAPP RL (Sensitivity) Requirements

Analyte	Sample ID # (s) Affected	Highest RL reported (units)	QAPP RL (units)	Reason (% solids; blank action; etc.)

all met project requirements

Data Summary Key for Data Usability Checklist Review

J - The associated numerical value is an estimated quantity due to quality control criteria exceedance(s). The value is usable for project decisions as an estimated result.

U - The analyte was analyzed for, but was not detected. The associated numerical value is the sample reporting/quantitation limit. The value is usable for project decisions as a nondetect result at the reporting limit.

UJ - The analyte was analyzed for, but was not detected. The associated numerical value is the sample reporting/quantitation limit and is an estimated quantity. The value is usable for project decisions as a non-detect result at the estimated reporting limit.

R - Reject data due to severe or cumulative exceedance of quality control criteria. The value is unusable (analyte may or may not be present) for project decisions. Re-sampling and reanalysis is necessary for verification.

NA - Not Analyzed

Bibliography

Industri-Plex Trust, 1999. *Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts,* July 1999. Menzie, Cura & Associates, Chelmsford, MA.

USEPA, 1992. *Guidance for Data Useability in Risk Assessment* (Part A), Publication 9285.7-09A.

USEPA, 1994. *Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses,* June 13, 1988, modified February 1989.

USEPA 1996. Region I, EPA-NE *Data Validation Functional Guidelines for Evaluating Environmental Analyses.*

Data Usability Review
Organic Analysis by Modified Method 8270C, 8260B, 8081A, and 8082
EPA Region I Tier III – type review

Client: Menzie-Cura & Associates, Inc.

Site: Industri-Plex, Woburn, Massachusetts

Laboratory: Woods Hole Group Environmental Laboratory, Raynham, MA

SDG: ETRs: 42547, 42551, 42574, and 42575

# of samples/Analyses: 17 surface water and 6 field blank samples for Volatiles, Semivolatiles, Pesticides and PCB analyses

Initial Reviewer: Dr. Nancy C. Rothman, New Environmental Horizons, Inc. N. C. R.

Senior Reviewer: Susan D. Chapnick, New Environmental Horizons, Inc. S.D. Chapnick

Date Completed: October 18, 1999

The Data Usability Review, representing a Region I Tier III-type validation, was performed on the data package. The intentions of this review are: 1) to determine if the data were generated and reported in accordance with SW-846 Methods 8260B, 8270C, 8081A, 8082, the *Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts, July 1999*, Region I, EPA-NE *Data Validation Functional Guidelines for Evaluating Environmental Analyses; Part II. Volatile/Semivolatile Data Validation Functional Guidelines*, 12/96 2), and the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, EPA540/R-94/012, February 1994; 2) to determine if the data met the program data quality objectives for acceptable accuracy, precision, and sensitivity; 3) to determine and define the technical usability of the data based on the accuracy, precision, and sensitivity QA/QC indicators; and 4) to update the project database with appropriate data quality qualifiers.

The Data Usability Review consists of five main sections. Section I is the Overall Summary of Data Usability including subsections addressing technical usability, accuracy, precision, and sensitivity of the data. Section II is the Data Package Completeness Review. Section III is the Review of the Laboratory Data Summary Forms and Additional QA/QC Parameters to determine if the QC requirements met and to determine the affect of exceeded QC requirements on the precision, accuracy, and sensitivity of the data. Section IV is the Review of the Overall Data Package to determine if contractual requirements were met. Section V is Example Sample Calculations to determine if the sample results and reporting limits were correctly calculated and reported by the laboratory.

I. Overall Summary of Data Usability

A. Summary of Technical Usability

All 17 surface water and 6 field blank results (including 1 Trip Blank and 5 Field Rinsate Blanks) for Volatile Organics (VOC), Semivolatile Organics (SVOC), Pesticides (Pest) and Polychlorinated Biphenyls (PCBs) included in the laboratory data package reviewed, identified by Woods Hole Group Environmental Laboratory (WHG) as project numbers (ETRs) 42547, 42551, 42574, and 42575 are usable for project objectives. Results have been estimated (UJ) for several compounds in all of the surface water samples and field blanks due to quality control criteria exceedances. Data users should note the following uncertainties in the estimated results. The estimated results are usable for project objectives.

B. Technical Issues Affecting Accuracy

Holding times, calibration criteria, surrogate recoveries, laboratory control sample recoveries, matrix spike/matrix spike duplicate recoveries, and other method-specific QC sample results were reviewed to evaluate the accuracy of the surface water results.

Volatile Organic Compound (VOC) Results

All quality control information, such as holding times, surrogate recoveries and matrix spike recoveries, associated with accuracy met QAPP and method criteria for the VOC results in these surface water samples.

Semivolatile Organic Compound (SVOC) Results

Surrogate recovery in one surface water sample was high, outside criteria for all three Base/Neutral surrogates. The laboratory speculated that a double spike of surrogate may have occurred during extraction. Since the sample did not report any positive results for SVOC, no action was taken to qualify the sample data.

All other quality control information, such as holding times, surrogate recoveries and matrix spike recoveries, associated with accuracy met QAPP and method criteria for the other SVOC results in these surface water samples.

Pesticide and PCB (Pest/PCB) Results

All quality control information, such as holding times, surrogate recoveries and matrix spike recoveries, associated with accuracy met QAPP and method criteria for the Pesticide and PCB results in these surface water samples.

C. Technical Issues Affecting Precision and Representativeness

The relative percent difference (RPD) between matrix spike and matrix spike duplicate results and between field duplicate pair results were evaluated to assess precision and representativeness of the surface water data.

Volatile Organic Compound (VOC) Results

Precision was acceptable for VOC results based upon the matrix spike (MS) and matrix spike duplicate (MSD) results. This is an indication of acceptable precision in the laboratory analysis of the surface and field blank waters within this SDG.

One field duplicate pair was associated with this SDG: SD-02 and SD-02DUP. The VOC results for both of these samples were all non-detect; therefore, precision from the field through analysis could not be assessed.

Semivolatile Organic Compound (SVOC)Results

Precision was acceptable for SVOC results based upon the matrix spike (MS) and matrix spike duplicate (MSD) results. This is an indication of acceptable precision in the laboratory analysis of the surface and field blank waters within this SDG.

One field duplicate pair was associated with this SDG: SD-02 and SD-02DUP. The SVOC results for both of these samples were all non-detect; therefore, precision from the field through analysis could not be assessed.

Pesticide/PCB (Pest/PCB) Results

Precision was slightly compromised for the Pest/PCB results based upon the matrix spike (MS) and matrix spike duplicate (MSD) results. The relative percent difference (RPD) for heptachlor was 38% (compared to QAPP criteria of RPD ≤ 22%) and for gamma-BHC at 24% (compared to QAPP criteria of ≤ 15%). All other MS/MSD components met QAPP precision objectives. Based on these MS/MSD results, the unspiked sample, SD-03, was qualified as estimated (UJ) for heptachlor and gamma-BHC. The precision of the analytical system did not meet project objectives for these two pesticide components; however, the non detected results for these compounds are usable as estimated values.

One field duplicate pair was associated with this SDG: SD-02 and SD-02DUP. The Pest/PCB results for both of these samples were all non-detect; therefore, precision from the field through analysis could not be assessed.

D. Technical Issues Affecting Sensitivity

Blank contamination in method and field blanks, initial and continuing calibrations, and MDLs were reviewed to assess sensitivity of the results compared to QAPP reporting limits.

Volatile Organic Compound (VOC) Results

The QAPP required reporting limit (RL) for all volatile analytes was 2 μg/L. The laboratory reporting limit for all components, except acetone and methylene chloride, was 2 μg/L, which corresponded to the sample-equivalent reporting limit of the laboratory's lowest concentration initial calibration standard. For acetone and methylene chloride, the lowest initial calibration standard was at 5 μg/L; therefore, the reporting limit for these two compounds was 5 μg/L for the surface water and field blank samples within this project. The methylene chloride and acetone RL of 5 μg/L meets the Ecological and Human Health Risk Based Criteria for this project and are therefore, usable.

The method 8260B and Region 1 criteria for initial calibration of percent relative standard deviation (%RSD) ≤ 30% was not met for bromomethane and methylene chloride (%RSD = 38.2% and 30.8%, respectively). The cause of the non-linearity for each of these compounds was investigated and it was shown that for bromomethane, elimination of the highest point calibration standard returned the %RSD to within criteria. For methylene chloride, elimination of the lowest level calibration standard returned the %RSD to within criteria. Based on Region 1 validation guidelines, since all results for bromomethane were non-detects, no action was taken to qualify the non-detected data since accuracy at the RL was established. For methylene chloride however, all results were qualified as estimated (UJ) due to uncertainty in quantitation at the sample-specific reporting limits. These estimated results are usable.

The method 8260B criteria for calibration verification of percent difference (%D) ≤ ± 25% was not achieved for several compounds in several continuing calibrations (see page 5- and 5A-VOA). Several non-detected results for bromomethane, chloromethane, chloroethane, and carbon disulfide in sixteen surface water samples and the Trip Blank (6/18/99) were qualified as estimated (UJ) due to exceedances of the %D in the Continuing Calibrations. These estimated non-detected results are usable.

The Trip Blank 6/18 contained trace-level acetone at 5 μg/L and chloroform at 1 μg/L. None of the surface water samples reported positive results for chloroform; therefore, no blank action was required for this compound. The Action level for acetone associated with this field blank was 50 μg/L. Samples SD-06, SD-07Deep, SD-05Shallow, SD-02DUP, and SD-09, associated with this Trip Blank, also reported trace levels (below the RL) of acetone. Action was taken to negate (U) the acetone results in these five surface water samples and the level raised for acetone to the sample-specific reporting limit. These negated levels still meet the Ecological Risk Based Criteria for acetone and are usable.

All other VOC results met sensitivity requirements as stated in the QAPP project-specific reporting limits.

Semivolatile Organic Compound (SVOC) Results

The QAPP required reporting limit (RL) for all semivolatile analytes ranged from 5 to 12 µg/L. The lowest concentration initial calibration standard actually used by the laboratory was 2 µg/mL which is equivalent to a sample-specific RL of 4 µg/L: lower than the QAPP required RL for most compounds. The QAPP RL for hexachlorocyclopentadiene was 5 µg/L; however, the lowest concentration initial calibration standard for this compound was at 5 µg/mL which corresponds to a sample-specific RL of 10 µg/L. This compound was not detected in any sample. The laboratory incorrectly reported this compound using the 4 µg/L RL; therefore, in all samples, the reporting limit for hexachlorocyclopentadiene was raised to the actual sample-specific limit achievable based on the lowest initial calibration standard at 5 µg/mL. Conversely, the laboratory reported all data for 3-nitroaniline assuming a lowest initial calibration standard of 5 µg/mL; however, the initial calibration showed that this analyte was present in the 2 µg/mL calibration standard and that acceptable linearity across the initial calibration was achieved using this lowest standard. Therefore, the RL for 3-nitroaniline was lowered to the sample-specific level equivalent to the 2 µg/mL standard and is consistent with the RL requested in the QAPP. These amended reporting limits still meet the Ecological Risk Based Criteria and are usable.

The QAPP required RL for 2,4-dinirophenol, 4-nitrophenol, 4,6-dinitro-2-methylphonel, pentachlorophenol, 2,4,5-tricholorophenol, 2-nitroaniline, and 4-nitroaniline was 12 µg/L. In samples SD-02, SD-02DUP, SD-01, and SD-11, the actual sample-specific reporting limit for these compounds was 13 µg/L due to limited sample volume for extraction. These reporting limits still meet the Ecological Risk Based Criteria and are usable.

The method 8270C and Region I criteria for initial calibration of percent relative standard deviation (%RSD) ≤ 30% was not met for 2,4-dinitrophenol (%RSD = 72.2%), hexachlorobutadiene (%RSD = 33.0%), and 4,6-dintro-2-methylphenol (%RSD = 36.1%). These three compounds were not detected in any of the samples. For all three compounds, the lowest calibration standard response was the primary source for non-linearity, therefore, for all samples, the non-detected results for these compounds were qualified as estimated (UJ) due to uncertainty in quantitation near the RL.

The method 8270C criteria for calibration verification of percent difference (%D) ≤ ± 25% was not achieved for two compounds (hexachlorocyclopentadiene and dinitrophenol) in several continuing calibrations (see page 5-SVOC). The affected non-detected surface water and rinsate blank results for these compounds were qualified as estimated (UJ). The estimated results are usable.

Pesticide/PCB (Pest/PCB) Results

The QAPP required RL for methoxychlor 0.05 µg/L. In samples SD-04 and SD-09 the RL for methoxychlor was 0.051 µg/L and in sample SD-08 the methoxychlor RL was 0.053 µg/L. These RLs were elevated due to limited sample volume for extraction.

The method 8081A/8082 criteria for calibration verification of percent difference (%D) or percent Drift (%Drift) ≤ ± 15% was not achieved for several compounds in several continuing calibrations (see pages 7-, 8-, 9-, and 9A-Pest/PCB). In addition, the laboratory convention for calculation of %Drift used a formula given in Method 8000B which reversed the numerator for the calculation (Method 8000B %Drift = (Found – True)/True as compared to standard convention of (True – Found)/True); therefore, all %Drift results cited in this report used the laboratory's convention for the calculation. Several non-detected results for alpha-BHC, gamma-BHC, 4,4'-DDT, endrin aldehyde, methoxychlor, and endrin ketone were qualified as estimated (UJ) in the associated surface water and field blank samples based upon the continuing calibration results. These estimated non-detected results are usable.

E. Additional Technical and QA/QC Issues

A review of method compliance, an evaluation of method modifications, and other QA/QC issues were made to evaluate the comparability of the data generated for the project uses.

Volatile Organic Compound (VOC) Results

The Form 5s, showing BFB Tune summary criteria, erroneously show the latest CLP SOW criteria for tune acceptance. The raw data from the GC/MS system accurately has the 8260B criteria and all tunes did meet these criteria. This is a reporting form error that the laboratory is aware of but can not fix using the software they currently employ.

The laboratory used the surrogate 1,2-dichloroethane-d_4 in place of the QAPP suggested surrogate dibromofluoromethane (two other surrogates were the same as suggested in the QAPP). In addition, the laboratory acceptance criteria for surrogate and MS/MSD recoveries were based on laboratory control charted limits as required by Method 8260B. These laboratory limits were in most cases tighter than those given in the QAPP and in all cases, were technically acceptable compared to the QAPP criteria.

Semivolatile Organic Compound (SVOC) Results

For semivolatile analysis, the laboratory spiked only the Base/Neutral surrogates into the samples prior to extraction. This was mistakenly done since this is the protocol the laboratory must follow for the extraction of the sediment samples (due to limited sample size, the semivolatiles, pesticides and PCBs are extracted together and addition of the Acid surrogates would interfere with pesticide analysis). Andy Beliveau, Region 1 QA Officer, was contacted and it was decided that action would be taken for the acidic semivolatile compounds if and only if the other QC elements, such as LCS and MS/MSD, showed poor acid compound recovery. Since the LCS and MS/MSDs were all acceptable for the acidic semivolatile compounds, no action was taken to qualify the semivolatile data based on the lack of acid surrogate spikes. The laboratory has amended this protocol and will in the future spike both Base/Neutral and Acid surrogates during the extraction of aqueous samples.

The Form 5s, showing DFTPP Tune summary criteria, erroneously show the latest CLP SOW criteria for tune acceptance. The raw data from the GC/MS system accurately has the 8270C criteria and all tunes did meet these criteria. This is a reporting form error that the laboratory is aware of but can not be fix using the software they currently employ.

Pesticide/PCB (Pest/PCB) Results

For Pesticide/PCB analysis, the laboratory used second-order curve statistics to develop the initial calibrations. An initial evaluation of the Pesticide calibrations showed that the laboratory had erroneously forced the curves through the origin during their curve statistics processing. The origin was not used in the PCB initial calibration curve processing. The laboratory was contacted on September 24, 1999 (Resubmittal issued) and they were asked to reprocess all initial calibrations without using the origin as a calibration point, to reprocess all continuing calibrations, and to reprocess any sample data which may have been affected by a change in calibration (e.g., no sample data required reprocessing since all results were non-detects; however, laboratory control spikes (LCS) and MS/MSD did require reprocessing). On October 11, 1999, reprocessed data were received for Pesticides and these data were inserted in the data package (the original data are included in the project files for documentation only). Note that this regeneration process resulted in different continuing calibration results in some cases. NEH initiated a corrective action and the laboratory has changed their Pesticides calibration to ensure that all future work does not force the calibration curves through the origin.

The pesticide and PCB analyses were performed on the same extract using a single long analysis run time to allow the determination of the pesticides and PCBs without interference. As such, the MS/MSD performed was done using only pesticide spikes – no PCB MS/MSD was performed. In addition, the laboratory used laboratory generated recovery acceptance criteria for the MS/MSD (and LCS) which were actually tighter than those given in the QAPP. Therefore, the laboratory limits for MS/MSD were considered acceptable for project objectives.

The precision acceptance criteria for the MS/MSD (RPD) were set by the laboratory at 50% on their report forms. This is greater than the acceptable RPD for precision defined in the Site QAPP (criteria ranged from 15% to 27% for different pesticide MS compounds). The laboratory was contacted and it was determined that the 50% level was an arbitrary precision value (not based on control charting); therefore, precision objectives during this assessment were judged versus those given in the QAPP and not based on the laboratory-reported precision criteria.

F. Summary of Completeness, Documentation, and Chain-of-Custody Issues

Chain-of-custody (COC) documentation of temperature on receipt at the laboratory was missing for several COCs. For samples received 6/21/99, a receipt temperature of 7°C was recorded. This exceeds the criterion of 4 $\pm$ 2 °C. The samples were collected in the summer and immediately sent via courier to the laboratory. Only surface water samples were collected associated with this COC. It appears that they did not have a chance to cool-down completely by the time they were received at the laboratory. No action was taken other than to note this discrepancy.

Due to a sampling miscommunication, a Trip Blank for VOC analysis was not taken on each day of sampling. A water Trip Blank accompanied the samples to the laboratory on June 18, 1999 (called Trip Blank 6/18). No Trip Blanks were received with the sampling events on June 17, 21, or 22, 1999. The one Trip Blank received was associated with all of the surface waters within this project. Note that samples were received at the laboratory within several hours of sampling on the same day of sampling for each sampling event.

Indication of "sediment" or "surface water" for the association of the five rinsate blanks was not made on the chain-of-custodies. However, personal communication with the sampler, Peter Kane of Woods Hole Group Environmental Laboratory, confirmed that the rinsate blanks were taken as rinses of the Eckman grab samplers used for sediment collection.

Times of sampling were not recorded on the chain-of-custody's for the sampling done on June 21 and June 22, 1999.

The data report received was missing a continuing calibration verification standard for VOC. On September 29, 1999, a resubmittal request asking for the missing calibration standard was issued. The missing data were received by fax on September 29, 1999 and inserted into the original data package. The data package was made complete and compliant with the receipt of the resubmittal.

The sampling information was incorrect in the excel database file of results (generated by the laboratory) for several samples. The corrected information was added to the sample results during this assessment. The project data file was made complete and compliant with these corrections.

The laboratory reported results for several analytes at a level below their reporting limit and qualified the data as estimated (J) due to uncertainty in quantitation. During this Data Usability Review, the "J" qualifier on data of this type was accepted, unless otherwise negated by actions taken during assessment, and was associated with the final results (i.e., the "J" was carried forward to the final data usability qualification of results).

NEH generated a data summary table based on the project data file supplied by the laboratory including the corrections and qualifications added to the data based on this Data Usability Review. The data summary table of technically valid and usable results for surface waters reviewed by NEH is attached to this report.

II. Data Package Completeness

The data package is reviewed for completeness using the Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts, July 1999.

1. Were all required reporting forms and associated raw data included in the data package? Yes / No. If no, contact laboratory for resubmittals and attach copy of resubmittal request to this checklist.

2. Was the data accompanied by a Data Review Checklist / Project Narrative explaining any non-compliance issues with the analyses? Yes / No. Was the narrative complete? Yes / No.

3. Were all samples listed in the laboratory data review checklists included in the data package? Yes / No. Were all sample analyses requested on the Traffic report and Chain-of-Custody performed by the laboratory? Yes / No. Were there any Chain-of-custody deviations noted? (e.g., labeling discrepancy between sample jar and COC, temperature outside of requirements, etc.) Yes / No.

Comments:

- All COC's note T upon Receipt = 4°C - 5°C
- Samples taken on 6/21/99 + 6/22/99 Did not record time of sampling on the COCs.
- Resubmittal 092999 Volatiles issued to obtain missing CCAL from 6/29/99 - See page 3A. Response from lab received 9/29/99 via fax.
- Resubmittal 092499 Pesticides issued since it was discovered that the lab had forced the calibration curves through the origin for Pesticides - See page 3B Reissued pesticide data received 10/11/99
- Sample IDs were inconsistently recorded on the COC. All Sample IDs were corrected in the format "SD-01" for the data summary tables.

DC 10/27/99

34 Pheasant Run Drive, Skillman, NJ 08558
63 College Avenue, Arlington, MA 02474
Phone: (908) 874-5686 ◊ (781) 643-4294 ◊ Fax: (908) 874-4786
Email: NCR@ix.netcom.com ◊ Chapnick@world.std.com

New Environmental Horizons, Inc.

Fax

To:	Heldar Costa, WHG	**From:**	Nancy C. Rothman, Ph.D.
Fax:	508-822-3288	**Pages:**	1
Phone:	508-822-9300	**Date:**	September 29, 1999
Re:	**Resubmittal Request**	**CC:**	Susan D. Chapnick
	Industri-Plex Data		
	Volatile Organics		

√ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

Water ETRs:42547, 42551, 42574, and 42575

Volatile Continuing Calibration data

The continuing calibration on 6/29/99 on VOA#1 Lab file ID C1062901.D is missing from the data package. Please provide this missing CCAL.

Thank you for your prompt response to this resubmittal. Please forward your response to:

Nancy C. Rothman
NEH, Inc.
34 Pheasant Run Drive
Skillman, NJ 08558
phone: 908-874-5686
fax: 908-874-4786

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Email: NCR@ix.netcom.com ◊ Chapnick@world.std.com

New Environmental Horizons, Inc.

Fax

To:	Heldar Costa, WHG	**From:**	Nancy C. Rothman, Ph.D.
Fax:	508-822-3288	**Pages:**	**1**
Phone:	508-822-9300	**Date:**	September 24, 1999
Re:	**Resubmittal Request**	**CC:**	Susan D. Chapnick
	Industri-Plex Data		
	Organics		

√ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

This Resubmittal Request is to document and confirm my telephone conversation today with Pete Kane regarding the issue below.

Pesticide Calibration data

In performing my review of the Pesticide's work on Industri-Plex, I saw that the initial calibrations for the Pesticides used calibration curve statistics for verifying the initial calibration and for performing quantitation of the Pesticides. All of the compounds reviewed used curves (i.e., not average Calibration Factors) and all indicate that the curve statistics were derived by FORCING THE CURVE THROUGH THE ORIGIN. This is unacceptable – the curves may NEVER be forced through the origin for a valid calibration. I reviewed the electronic files you sent on Industri-Plex and see that for several samples across all of the data submitted, that Pesticides were detected. These data need to be reprocessed using the correct calibration technique, re-quantitated, and re-reported. Please ensure that all of your staff (GC and GC/MS) know that curves may NOT be forced through the origin if used. I did a cursory check on the VOA and SVOC data and think that average RRFs were used here; however, expect a resubmittal request for these analyses if I do see any curve data.

Thank you for your prompt response to this resubmittal. Please forward your response to:

Nancy C. Rothman
NEH, Inc.
34 Pheasant Run Drive
Skillman, NJ 08558
phone: 908-874-5686
fax: 908-874-4786

Data Summary Key for Data Usability Checklist Review

J - The associated numerical value is an estimated quantity due to quality control criteria exceedance(s). The value is usable for project decisions as an estimated result.

U - The compound was analyzed for, but was not detected. The associated numerical value is the sample detection/quantitation limit. The value is usable for project decisions as a nondetect result at the reported detection/quantitation limit.

UJ - The compound was analyzed for, but was not detected. The associated numerical value is the sample detection/quantitation limit and is an estimated quantity. The value is usable for project decisions as a nondetect result at the estimated detection/quantitation limit.

R - Reject data due to severe or cumulative exceedance of quality control criteria. The value is unusable (compound may or may not be present) for project decisions. Resampling and reanalysis is necessary for verification.

TB The compound was detected in a Trip Blank

EB - The compound was detected in an Equipment Blank.

BB - The compound was detected in a Bottle Blank.

NA - Not Analyzed

Validation Checklist Review Acronyms

BB	-	Bottle Blank
CCAL	-	Continuing Calibration
CLP	-	Contract Laboratory Program
%D	-	Percent Difference = (A – B)/A x 100)
%Drift	-	Percent Drift = Percent Recovery = ((True-Found)/True X 100)
DQO	-	Data Quality Objective
EB	-	Equipment Blank (Rinsate)
EPA	-	Environmental Protection Agency
FB	-	field blank
g	-	gram
GC/MS -		Gas Chromatography/Mass Spectrometry
ICAL	-	Initial Calibration
Kg	-	kilogram
L	-	liter
LCS	-	Laboratory Control Sample
MDL		Method Detection Limit
MS	-	Matrix Spike
MSD	-	Matrix Spike Duplicate
mg	-	milligram
NA	-	not applicable
ND	-	non-detect
QA	-	Quality Assurance
QC	-	Quality Control
RL		Reporting Limit
RPD	-	Relative Percent Difference ([(| A-B |)/ ½ (A + B)] X 100)
%RSD	-	Percent Relative Standard Deviation (SD/Average Value X 100)
SRM	-	Standard Reference Material
SVOC	-	Semivolatile Organic Compound
TCL	-	Target Compound List
TIC	-	Tentatively Identified Compounds
μg/Kg	-	micrograms per kilogram
μg/L	-	micrograms per liter

Bibliography

Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts, July 1999.

Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses; Part II. Volatile/Semivolatile Data Validation Functional Guidelines, 12/96.

Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Updates II and III (USEPA, Office of Solid Waste and Emergency Response, Washington, DC, September 1995 and December 1996). Methods 8260B, 8270C, 8081A, and 8082.

USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA540/R-94/012, February 1994.

Industri-Plex, Woburn, MA
Site Locations - Organic Surface Water Data

Validated 10/27/99
NEH, Inc.

Client Sample ID:	SD-13			SD-11			SD-10			SD-09			SD-08		
Lab Sample ID:	42547-4			42574-5			42574-4			42575-2			42575-1		
Sample Date:	06/17/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units	ug/L	Qual.	Qual	ug/L	Qual.	Qual	ug/L	Qual.	Qual	ug/L	Qual.	Qual	ug/L	Qual.	Qual
Analyte-Volatile Organic Compounds (VOC)															
EPA Method 8260B															
Chloromethane	2	U	UJ	2	U	U	2	U	U	2	U	U	2	U	U
Vinyl chloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromomethane	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
Chloroethane	2	U	U	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
Acetone	5	U	U	5	U	U	5	U	U	5	JB	U	5	U	U
1,1-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Carbon disulfide	2	U	U	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
Methylene chloride	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ
trans-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
2-Butanone (MEK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
cis-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U	1	J	J	2		
Chloroform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,1-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Carbon tetrachloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Benzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Trichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	J	J
1,2-Dichloropropane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromodichloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Methyl isobutyl ketone (MIBK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
cis-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Toluene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
trans-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,2-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
2-Hexanone	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Tetrachloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Dibromochloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,2-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Chlorobenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Ethylbenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
p/m-Xylene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
o-Xylene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Styrene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromoform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,2,2-Tetrachloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at an estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Surface Water Data

Client Sample ID:	SD-07DEEP			SD-07SHALLOW			SD-06			SD-05DEEP			SD-05SHALLOW		
Lab Sample ID:	42551-6			42551-7			42551-5			42551-8			42551-9		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual	ug/L	Qual.	Qual	ug/L	Qual.	Qual	ug/L	Qual.	Qual	ug/L	Qual.	Qual
nalyte-Volatile Organic Compounds (															
PA Method 8260B															
hloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
nyl chloride	1	J	J	2	U	U	2	U	U	3			2	U	U
romomethane	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
hloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
cetone	5	J	U	5	U	U	5	J	U	5	U	U	5	J	U
1-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
arbon disulfide	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
ethylene chloride	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ
ans-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
-Butanone (MEK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
s-1,2-Dichloroethene	6			2			2			13			2		
hloroform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
arbon tetrachloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
enzene	63			2	U	U	2	U	U	190			2	U	U
richloroethene	2	J	J	2	J	J	2	J	J	4			2	J	J
2-Dichloropropane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
romodichloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
lethyl isobutyl ketone (MIBK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
is-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
oluene	2	U	U	2	U	U	4			2	U	U	2	U	U
ans-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,2-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
-Hexanone	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
etrachloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
ibromochloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
2-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
hlorobenzene	1	J	J	2	U	U	2	U	U	4			2	U	U
thylbenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
/m-Xylene	4	U	U	4	U	U	4	U	U	2	J	J	4	U	U
-Xylene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
tyrene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
romoform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,2,2-Tetrachloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at an estimated reporting li

Industri-Plex, Wob[illegible] MA
Site Locations - Organic Su[illegible] Water Data

Validated 10/27/9[illegible]
NEH, In[illegible]

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	42551-4		
Sample Date:	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual
Analyte-Volatile Organic Compounds (V			
EPA Method 8260B			
Chloromethane	2	U	U
Vinyl chloride	2	U	U
Bromomethane	2	U	UJ
Chloroethane	2	U	U
Acetone	5	J	J
1,1-Dichloroethene	2	U	U
Carbon disulfide	2	U	U
Methylene chloride	5	U	UJ
trans-1,2-Dichloroethene	2	U	U
1,1-Dichloroethane	2	U	U
2-Butanone (MEK)	2	U	U
cis-1,2-Dichloroethene	2	U	U
Chloroform	1	J	J
1,1,1-Trichloroethane	2	U	U
Carbon tetrachloride	2	U	U
Benzene	2	U	U
Trichloroethene	2	U	U
1,2-Dichloropropane	2	U	U
Bromodichloromethane	2	U	U
Methyl isobutyl ketone (MIBK)	2	U	U
cis-1,3-Dichloropropene	2	U	U
Toluene	2	U	U
trans-1,3-Dichloropropene	2	U	U
1,1,2-Trichloroethane	2	U	U
2-Hexanone	2	U	U
Tetrachloroethene	2	U	U
Dibromochloromethane	2	U	U
1,2-Dichloroethane	2	U	U
Chlorobenzene	2	U	U
Ethylbenzene	2	U	U
p/m-Xylene	4	U	U
o-Xylene	2	U	U
Styrene	2	U	U
Bromoform	2	U	U
1,2,2-Tetrachloroethane	2	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at an estimated reporting limit.

Industri-Plex, Woburn, MA
Reference Locations - Organic Surface Water Data

nple Location ID:	SD-01			SD-02			SD-02DUP			SD-03			SD-03DEEP		
i Sample ID:	42574-3			42574-1			42574-2			42551-1			42551-2		
e Sampled:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
ts	ug/L	Qual.	Qual	ug/L	Qual.	Qual	ug/L	Qual.	Qual	ug/L	Qual.	Qual	ug/L	Qual.	Qual
alyte-Volatile Organic Compounds (VOC)							Field Duplicate								
A Method 8260B															
loromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
yl chloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
omomethane	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
loroethane	2	U	UJ	2	U	UJ	2	U	UJ	2	U	U	2	U	U
etone	5	U	U	5	U	U	5	JB	U	5	U	U	5	U	U
-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
rbon disulfide	2	U	UJ	2	U	UJ	2	U	UJ	2	U	U	2	U	U
ethylene chloride	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ
ns-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Butanone (MEK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
s-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
loroform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
rbon tetrachloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
nzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
ichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
2-Dichloropropane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
omodichloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
ethyl isobutyl ketone (MIBK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
s-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
oluene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
ans-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,2-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Hexanone	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
etrachloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
ibromochloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
,2-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
hlorobenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
thylbenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
/m-Xylene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
-Xylene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
tyrene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
romoform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
,1,2,2-Tetrachloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting li

Industri-Plex, Wob... MA
Reference Locations - Organic ...face Water Data

Sample Location ID:	SD-04			SD-12		
Lab Sample ID:	42547-1			42547-3		
Date Sampled:	06/17/99	Lab	DV	06/17/99	Lab	DV
Units	ug/L	Qual.	Qual	ug/L	Qual.	Qual
Analyte-Volatile Organic Compounds (V						
EPA Method 8260B						
Chloromethane	2	U	UJ	2	U	UJ
Vinyl chloride	2	U	U	2	U	U
Bromomethane	2	U	UJ	2	U	UJ
Chloroethane	2	U	U	2	U	U
Acetone	5	U	U	5	U	U
1,1-Dichloroethene	2	U	U	2	U	U
Carbon disulfide	2	U	U	2	U	U
Methylene chloride	5	U	UJ	5	U	UJ
trans-1,2-Dichloroethene	2	U	U	2	U	U
1,1-Dichloroethane	2	U	U	2	U	U
2-Butanone (MEK)	2	U	U	2	U	U
cis-1,2-Dichloroethene	2	U	U	2	U	U
Chloroform	2	U	U	2	U	U
1,1,1-Trichloroethane	2	U	U	2	U	U
Carbon tetrachloride	2	U	U	2	U	U
Benzene	2	U	U	2	U	U
Trichloroethene	2	U	U	2	U	U
1,2-Dichloropropane	2	U	U	2	U	U
Bromodichloromethane	2	U	U	2	U	U
Methyl isobutyl ketone (MIBK)	2	U	U	2	U	U
cis-1,3-Dichloropropene	2	U	U	2	U	U
Toluene	2	U	U	2	U	U
trans-1,3-Dichloropropene	2	U	U	2	U	U
1,1,2-Trichloroethane	2	U	U	2	U	U
2-Hexanone	2	U	U	2	U	U
Tetrachloroethene	2	U	U	2	U	U
Dibromochloromethane	2	U	U	2	U	U
1,2-Dichloroethane	2	U	U	2	U	U
Chlorobenzene	2	U	U	2	U	U
Ethylbenzene	2	U	U	2	U	U
p/m-Xylene	4	U	U	4	U	U
o-Xylene	2	U	U	2	U	U
Styrene	2	U	U	2	U	U
Bromoform	2	U	U	2	U	U
1,1,2,2-Tetrachloroethane	2	U	U	2	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Surface Water Data

Validated 10/27/99
NEH, Inc.

Client Sample ID:	SD-13			SD-11			SD-10			SD-09			SD-08		
Lab Sample ID:	42547-4			42574-5			42574-4			42575-2			42575-1		
Sample Date:	06/17/1999	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte-Semivolatile Organic Compounds (SVOC)															
EPA Method 8270C															
bis(2-Chloroethyl)ether	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Phenol	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2-Chlorophenol	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
1,3-Dichlorobenzene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
1,4-Dichlorobenzene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
1,2-Dichlorobenzene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
bis(2-chloroisopropyl)ether	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Hexachloroethane	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
N-Nitroso-di-n-propylamine	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Nitrobenzene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Isophorone	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2-Nitrophenol	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2,4-Dimethylphenol	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
bis(2-Chloroethoxy)methane	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2,4-Dichlorophenol	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
1,2,4-Trichlorobenzene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Naphthalene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Hexachlorobutadiene	5	U	UJ	5	U	UJ	4	U	UJ	4	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Hexachlorocyclopentadiene	12	U	UJ	13	U	U	10	U	U	11	U	U	11	U	U
2,4,6-Trichlorophenol	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2-Chloronaphthalene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Acenaphthylene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Dimethylphthalate	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2,6-Dinitrotoluene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Acenaphthene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2,4-Dinitrophenol	12	U	UJ	13	U	UJ	10	U	UJ	11	U	UJ	11	U	UJ
2,4-Dinitrotoluene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
4-Nitrophenol	12	U	U	13	U	U	10	U	U	11	U	U	11	U	U
Fluorene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
4-Chlorophenyl-phenylether	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Diethylphthalate	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
4,6-Dinitro-2-methylphenol	12	U	UJ	13	U	UJ	10	U	UJ	11	U	UJ	11	U	UJ
n-Nitrosodiphenylamine	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
4-Bromophenyl-phenylether	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Hexachlorobenzene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Wo[illegible]n, MA
Site Locations - Organic S[illegible]ce Water Data

Validated 10/27/[illegible]
NEH

Client Sample ID:	SD-13			SD-11			SD-10			SD-09			SD-08		
Lab Sample ID:	42547-4			42574-5			42574-4			42575-2			42575-1		
Sample Date:	06/17/1999	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte-Semivolatile Organic Compounds (SVOC)															
EPA Method 8270C															
Pentachlorophenol	12	U	U	13	U	U	10	U	U	11	U	U	11	U	U
Phenanthrene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Anthracene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Di-n-butylphthalate	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Fluoranthene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Pyrene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Butylbenzylphthalate	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
3,3'-Dichlorobenzidine	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Benzo[a]anthracene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Chrysene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Di-n-octylphthalate	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Benzo[b]fluoranthene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Benzo[k]fluoranthene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Benzo[a]pyrene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Indeno[1,2,3-cd]pyrene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Dibenz[a,h]anthracene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Benzo[g,h,i]perylene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2-Methylphenol	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
4-Methylphenol	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
4-Chloroaniline	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2-Methylnaphthalene	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
2,4,5-Trichlorophenol	12	U	U	13	U	U	10	U	U	11	U	U	11	U	U
2-Nitroaniline	12	U	U	13	U	U	10	U	U	11	U	U	11	U	U
3-Nitroaniline	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
Dibenzofuran	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U
4-Nitroaniline	12	U	U	13	U	U	10	U	U	11	U	U	11	U	U
Carbazole	5	U	U	5	U	U	4	U	U	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Surface Water Data

Validated 10/27/99
NEH, Inc.

Client Sample ID:	SD-07DEEP			SD-07SHALLOW			SD-06			SD-05DEEP			SD-05SHALLOW		
Lab Sample ID:	42551-6			42551-7			42551-5			42551-8			42551-9		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte-Semivolatile Organic Compoun															
EPA Method 8270C															
bis(2-Chloroethyl)ether	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Phenol	4	U	U	4	U	U	5	U	U	5			4	U	U
2-Chlorophenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
1,3-Dichlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
1,4-Dichlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
1,2-Dichlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
bis(2-chloroisopropyl)ether	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Hexachloroethane	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
N-Nitroso-di-n-propylamine	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Nitrobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Isophorone	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2-Nitrophenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,4-Dimethylphenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
bis(2-Chloroethoxy)methane	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,4-Dichlorophenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
1,2,4-Trichlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Naphthalene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Hexachlorobutadiene	4	U	UJ	4	U	UJ	5	U	UJ	4	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Hexachlorocyclopentadiene	11	U	UJ	11	U	UJ	11	U	UJ	11	U	UJ	10	U	UJ
2,4,6-Trichlorophenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2-Chloronaphthalene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Acenaphthylene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Dimethylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,6-Dinitrotoluene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Acenaphthene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,4-Dinitrophenol	11	U	UJ	11	U	UJ	11	U	UJ	11	U	UJ	10	U	UJ
2,4-Dinitrotoluene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Nitrophenol	11	U	U	11	U	U	11	U	U	11	U	U	10	U	U
Fluorene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Chlorophenyl-phenylether	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Diethylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4,6-Dinitro-2-methylphenol	11	U	UJ	11	U	UJ	11	U	UJ	11	U	UJ	10	U	UJ
n-Nitrosodiphenylamine	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Bromophenyl-phenylether	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Hexachlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit

Industri-Plex, Woburn, MA
Site Locations - Organic Surface Water Data

Validated 10/27
NEH

Client Sample ID:	SD-07DEEP			SD-07SHALLOW			SD-06			SD-05DEEP			SD-05SHALLOW		
Lab Sample ID:	42551-6			42551-7			42551-5			42551-8			42551-9		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte-Semivolatile Organic Compoun															
EPA Method 8270C															
Pentachlorophenol	11	U	U	11	U	U	11	U	U	11	U	U	10	U	U
Phenanthrene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Anthracene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Di-n-butylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Fluoranthene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Pyrene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Butylbenzylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
3,3'-Dichlorobenzidine	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[a]anthracene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Chrysene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Di-n-octylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[b]fluoranthene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[k]fluoranthene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[a]pyrene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Indeno[1,2,3-cd]pyrene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Dibenz[a,h]anthracene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[g,h,i]perylene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2-Methylphenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Methylphenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Chloroaniline	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2-Methylnaphthalene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,4,5-Trichlorophenol	11	U	U	11	U	U	11	U	U	11	U	U	10	U	U
2-Nitroaniline	11	U	U	11	U	U	11	U	U	11	U	U	10	U	U
3-Nitroaniline	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Dibenzofuran	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Nitroaniline	11	U	U	11	U	U	11	U	U	11	U	U	10	U	U
Carbazole	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Surface Water Data

Client Sample ID:	RINSE BLANK			RINSE BLANK			RINSE BLANK			RINSE BLANK A			RINSE BLANK B		
Lab Sample ID:	42547-2			42551-3			42562-3			42563-9			42563-14		
Sample Date:	06/17/99	Lab	DV	06/18/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/23/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte-Semivolatile Organic Compoun															
EPA Method 8270C															
bis(2-Chloroethyl)ether	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Phenol	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2-Chlorophenol	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
1,3-Dichlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
1,4-Dichlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
1,2-Dichlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
bis(2-chloroisopropyl)ether	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Hexachloroethane	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
N-Nitroso-di-n-propylamine	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Nitrobenzene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Isophorone	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2-Nitrophenol	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2,4-Dimethylphenol	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
bis(2-Chloroethoxy)methane	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2,4-Dichlorophenol	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
1,2,4-Trichlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Naphthalene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Hexachlorobutadiene	4	U	UJ	4	U	UJ	4	U	UJ	4	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Hexachlorocyclopentadiene	11	U	UJ	11	U	UJ	10	U	U	10	U	U	11	U	U
2,4,6-Trichlorophenol	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2-Chloronaphthalene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Acenaphthylene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Dimethylphthalate	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2,6-Dinitrotoluene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Acenaphthene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2,4-Dinitrophenol	11	U	UJ	11	U	UJ	10	U	UJ	10	U	UJ	11	U	UJ
2,4-Dinitrotoluene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
4-Nitrophenol	11	U	U	11	U	U	10	U	U	10	U	U	11	U	U
Fluorene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
4-Chlorophenyl-phenylether	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Diethylphthalate	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
4,6-Dinitro-2-methylphenol	11	U	UJ	11	U	UJ	10	U	UJ	10	U	UJ	11	U	UJ
n-Nitrosodiphenylamine	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
4-Bromophenyl-phenylether	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Hexachlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit

Industri-Plex, Woburn, MA
Site Locations - Organic Su Water Data

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Client Sample ID:	RINSE BLANK			RINSE BLANK			RINSE BLANK			RINSE BLANK A			RINSE BLANK B		
Lab Sample ID:	42547-2			42551-3			42562-3			42563-9			42563-14		
Sample Date:	06/17/99	Lab	DV	06/18/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/23/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte-Semivolatile Organic Compoun															
EPA Method 8270C															
Pentachlorophenol	11	U	U	11	U	U	10	U	U	10	U	U	11	U	U
Phenanthrene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Anthracene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Di-n-butylphthalate	6			4	U	U	4	U	U	24			2	J	J
Fluoranthene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Pyrene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Butylbenzylphthalate	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
3,3'-Dichlorobenzidine	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[a]anthracene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Chrysene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Di-n-octylphthalate	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[b]fluoranthene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[k]fluoranthene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[a]pyrene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Indeno[1,2,3-cd]pyrene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Dibenz[a,h]anthracene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[g,h,i]perylene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2-Methylphenol	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
4-Methylphenol	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
4-Chloroaniline	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2-Methylnaphthalene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
2,4,5-Trichlorophenol	11	U	U	11	U	U	10	U	U	10	U	U	11	U	U
2-Nitroaniline	11	U	U	11	U	U	10	U	U	10	U	U	11	U	U
3-Nitroaniline	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
Dibenzofuran	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
4-Nitroaniline	11	U	U	11	U	U	10	U	U	10	U	U	11	U	U
Carbazole	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Reference Locations - Organic Surface Water Data

Sample Location ID:	SD-01			SD-02			SD-02DUP			SD-03			SD-03DEEP		
Lab Sample ID	42574-3			42574-1			42574-2			42551-1			42551-2		
Date Sampled:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte-Semivolatile Organic Compounds (SVOC)							Field Duplicate								
EPA Method 8270C															
bis(2-Chloroethyl)ether	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Phenol	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2-Chlorophenol	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
1,3-Dichlorobenzene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
1,4-Dichlorobenzene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
1,2-Dichlorobenzene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
bis(2-chloroisopropyl)ether	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Hexachloroethane	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
N-Nitroso-di-n-propylamine	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Nitrobenzene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Isophorone	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2-Nitrophenol	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2,4-Dimethylphenol	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
bis(2-Chloroethoxy)methane	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2,4-Dichlorophenol	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
1,2,4-Trichlorobenzene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Naphthalene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Hexachlorobutadiene	5	U	UJ	5	U	UJ	5	U	UJ	4	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Hexachlorocyclopentadiene	13	U	U	13	U	U	13	U	U	11	U	UJ	11	U	UJ
2,4,6-Trichlorophenol	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2-Chloronaphthalene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Acenaphthylene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Dimethylphthalate	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2,6-Dinitrotoluene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Acenaphthene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2,4-Dinitrophenol	13	U	UJ	13	U	UJ	13	U	UJ	11	U	UJ	11	U	UJ
2,4-Dinitrotoluene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
4-Nitrophenol	13	U	U	13	U	U	13	U	U	11	U	U	11	U	U
Fluorene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
4-Chlorophenyl-phenylether	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Diethylphthalate	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
4,6-Dinitro-2-methylphenol	13	U	UJ	13	U	UJ	13	U	UJ	11	U	UJ	11	U	UJ
n-Nitrosodiphenylamine	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
4-Bromophenyl-phenylether	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Hexachlorobenzene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Wo n, MA
Reference Locations - Organ urface Water Data

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Sample Location ID:	SD-01			SD-02			SD-02DUP			SD-03			SD-03DEEP		
Lab Sample ID:	42574-3			42574-1			42574-2			42551-1			42551-2		
Date Sampled:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte-Semivolatile Organic Compounds (SVOC)							Field Duplicate								
EPA Method 8270C															
Pentachlorophenol	13	U	U	13	U	U	13	U	U	11	U	U	11	U	U
Phenanthrene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Anthracene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Di-n-butylphthalate	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Fluoranthene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Pyrene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Butylbenzylphthalate	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
3,3'-Dichlorobenzidine	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Benzo[a]anthracene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Chrysene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	5	U	U	5	U	U	5	U	U	4	U	U	3	J	J
Di-n-octylphthalate	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Benzo[b]fluoranthene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Benzo[k]fluoranthene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Benzo[a]pyrene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Indeno[1,2,3-cd]pyrene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Dibenz[a,h]anthracene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Benzo[g,h,i]perylene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2-Methylphenol	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
4-Methylphenol	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
4-Chloroaniline	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2-Methylnaphthalene	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
2,4,5-Trichlorophenol	13	U	U	13	U	U	13	U	U	11	U	U	11	U	U
2-Nitroaniline	13	U	U	13	U	U	13	U	U	11	U	U	11	U	U
3-Nitroaniline	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
Dibenzofuran	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U
4-Nitroaniline	13	U	U	13	U	U	13	U	U	11	U	U	11	U	U
Carbazole	5	U	U	5	U	U	5	U	U	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Reference Locations - Organic Surface Water Data

Sample Location ID:	SD-04			SD-12		
Lab Sample ID:	42547-1			42547-3		
Date Sampled:	06/17/1999	Lab	DV	06/17/1999	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual
Analyte-Semivolatile Organic Compoun						
EPA Method 8270C						
bis(2-Chloroethyl)ether	4	U	U	4	U	U
Phenol	4	U	U	4	U	U
2-Chlorophenol	4	U	U	4	U	U
1,3-Dichlorobenzene	4	U	U	4	U	U
1,4-Dichlorobenzene	4	U	U	4	U	U
1,2-Dichlorobenzene	4	U	U	4	U	U
bis(2-chloroisopropyl)ether	4	U	U	4	U	U
Hexachloroethane	4	U	U	4	U	U
N-Nitroso-di-n-propylamine	4	U	U	4	U	U
Nitrobenzene	4	U	U	4	U	U
Isophorone	4	U	U	4	U	U
2-Nitrophenol	4	U	U	4	U	U
2,4-Dimethylphenol	4	U	U	4	U	U
bis(2-Chloroethoxy)methane	4	U	U	4	U	U
2,4-Dichlorophenol	4	U	U	4	U	U
1,2,4-Trichlorobenzene	4	U	U	4	U	U
Naphthalene	4	U	U	4	U	U
Hexachlorobutadiene	4	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	4	U	U	4	U	U
Hexachlorocyclopentadiene	10	U	UJ	10	U	UJ
2,4,6-Trichlorophenol	4	U	U	4	U	U
2-Chloronaphthalene	4	U	U	4	U	U
Acenaphthylene	4	U	U	4	U	U
Dimethylphthalate	4	U	U	4	U	U
2,6-Dinitrotoluene	4	U	U	4	U	U
Acenaphthene	4	U	U	4	U	U
2,4-Dinitrophenol	10	U	UJ	10	U	UJ
2,4-Dinitrotoluene	4	U	U	4	U	U
4-Nitrophenol	10	U	U	10	U	U
Fluorene	4	U	U	4	U	U
4-Chlorophenyl-phenylether	4	U	U	4	U	U
Diethylphthalate	4	U	U	4	U	U
4,6-Dinitro-2-methylphenol	10	U	UJ	10	U	UJ
n-Nitrosodiphenylamine	4	U	U	4	U	U
4-Bromophenyl-phenylether	4	U	U	4	U	U
Hexachlorobenzene	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit

Industri-Plex, Wob[illegible], MA
Reference Locations - Organi[illegible] [illegible]rface Water Data

Validated 10/27/[illegible]
NEH, [illegible]

Sample Location ID:	SD-04			SD-12		
Lab Sample ID:	42547-1			42547-3		
Date Sampled:	06/17/1999	Lab	DV	06/17/1999	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual
Analyte-Semivolatile Organic Compoun						
EPA Method 8270C						
Pentachlorophenol	10	U	U	10	U	U
Phenanthrene	4	U	U	4	U	U
Anthracene	4	U	U	4	U	U
Di-n-butylphthalate	4	U	U	4	U	U
Fluoranthene	4	U	U	4	U	U
Pyrene	4	U	U	4	U	U
Butylbenzylphthalate	4	U	U	4	U	U
3,3'-Dichlorobenzidine	4	U	U	4	U	U
Benzo[a]anthracene	4	U	U	4	U	U
Chrysene	4	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	4	U	U	4	U	U
Di-n-octylphthalate	4	U	U	4	U	U
Benzo[b]fluoranthene	4	U	U	4	U	U
Benzo[k]fluoranthene	4	U	U	4	U	U
Benzo[a]pyrene	4	U	U	4	U	U
Indeno[1,2,3-cd]pyrene	4	U	U	4	U	U
Dibenz[a,h]anthracene	4	U	U	4	U	U
Benzo[g,h,i]perylene	4	U	U	4	U	U
2-Methylphenol	4	U	U	4	U	U
4-Methylphenol	4	U	U	4	U	U
4-Chloroaniline	4	U	U	4	U	U
2-Methylnaphthalene	4	U	U	4	U	U
2,4,5-Trichlorophenol	10	U	U	10	U	U
2-Nitroaniline	10	U	U	10	U	U
3-Nitroaniline	4	U	U	4	U	U
Dibenzofuran	4	U	U	4	U	U
4-Nitroaniline	10	U	U	10	U	U
Carbazole	4	U	U	4	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Surface Water Data

Validated 10/27/99
NEH, Inc.

Client Sample ID:	SD-13			SD-11			SD-10			SD-09			SD-08		
Lab Sample ID:	42547-4			42574-5			42574-4			42575-2			42575-1		
Sample Date:	06/17/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.		Qual.	Qual.		Qual.	Qual.
Analyte-PCBs and Pesticides															
EPA Methods 8082 and 8081A															
Aroclor 1016	0.044	U	U	0.043	U	U	0.041	U	U	0.051	U	U	0.053	U	U
Aroclor 1221	0.044	U	U	0.043	U	U	0.041	U	U	0.051	U	U	0.053	U	U
Aroclor 1232	0.044	U	U	0.043	U	U	0.041	U	U	0.051	U	U	0.053	U	U
Aroclor 1242	0.044	U	U	0.043	U	U	0.041	U	U	0.051	U	U	0.053	U	U
Aroclor 1248	0.044	U	U	0.043	U	U	0.041	U	U	0.051	U	U	0.053	U	U
Aroclor 1254	0.044	U	U	0.043	U	U	0.041	U	U	0.051	U	U	0.053	U	U
Aroclor 1260	0.044	U	U	0.043	U	U	0.041	U	U	0.051	U	U	0.053	U	U
Alpha-BHC	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Gamma-BHC	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Beta-BHC	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Delta-BHC	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Heptachlor	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Aldrin	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Heptachlor Epoxide	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Gamma Chlordane	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Alpha Chlordane	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Endosulfan I	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
4, 4'-DDE	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Dieldrin	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Endrin	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
4, 4'-DDD	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Endosulfan II	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
4, 4'-DDT	0.0089	U	U	0.0086	U	UJ	0.0082	U	UJ	0.010	U	UJ	0.010	U	UJ
Endrin Aldehyde	0.0089	U	U	0.0086	U	U	0.0082	U	UJ	0.010	U	U	0.010	U	U
Endosulfan Sulfate	0.0089	U	U	0.0086	U	U	0.0082	U	U	0.010	U	U	0.010	U	U
Methoxychlor	0.044	U	U	0.043	U	UJ	0.041	U	UJ	0.051	U	UJ	0.053	U	UJ
Endrin Ketone	0.0089	U	U	0.0086	U	UJ	0.0082	U	UJ	0.010	U	UJ	0.010	U	UJ
Toxaphene	0.089	U	U	0.086	U	U	0.082	U	U	0.10	U	U	0.10	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Surface Water Data

Validated 10/27/99
NEH, Inc.

Client Sample ID:	SD-07DEEP			SD-07SHALLOW			SD-06			SD-05DEEP			SD-05SHALLOW		
Lab Sample ID:	42551-6			42551-7			42551-5			42551-8			42551-9		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.
Analyte-PCBs and Pesticides															
EPA Methods 8082 and 8081A															
Aroclor 1016	0.042	U	U	0.042	U	U	0.041	U	U	0.044	U	U	0.044	U	U
Aroclor 1221	0.042	U	U	0.042	U	U	0.041	U	U	0.044	U	U	0.044	U	U
Aroclor 1232	0.042	U	U	0.042	U	U	0.041	U	U	0.044	U	U	0.044	U	U
Aroclor 1242	0.042	U	U	0.042	U	U	0.041	U	U	0.044	U	U	0.044	U	U
Aroclor 1248	0.042	U	U	0.042	U	U	0.041	U	U	0.044	U	U	0.044	U	U
Aroclor 1254	0.042	U	U	0.042	U	U	0.041	U	U	0.044	U	U	0.044	U	U
Aroclor 1260	0.042	U	U	0.042	U	U	0.041	U	U	0.044	U	U	0.044	U	U
Alpha-BHC	0.0083	U	UJ	0.0083	U	UJ	0.0082	U	UJ	0.0089	U	UJ	0.0088	U	UJ
Gamma-BHC	0.0083	U	UJ	0.0083	U	UJ	0.0082	U	UJ	0.0089	U	UJ	0.0088	U	UJ
Beta-BHC	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Delta-BHC	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Heptachlor	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Aldrin	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Heptachlor Epoxide	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Gamma Chlordane	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Alpha Chlordane	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Endosulfan I	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
4, 4'-DDE	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Dieldrin	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Endrin	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
4, 4'-DDD	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Endosulfan II	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
4, 4'-DDT	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Endrin Aldehyde	0.0083	U	UJ	0.0083	U	UJ	0.0082	U	UJ	0.0089	U	UJ	0.0088	U	UJ
Endosulfan Sulfate	0.0083	U	U	0.0083	U	U	0.0082	U	U	0.0089	U	U	0.0088	U	U
Methoxychlor	0.042	U	UJ	0.042	U	UJ	0.041	U	UJ	0.044	U	UJ	0.044	U	UJ
Endrin Ketone	0.0083	U	UJ	0.0083	U	UJ	0.0082	U	UJ	0.0089	U	UJ	0.0088	U	UJ
Toxaphene	0.083	U	U	0.083	U	U	0.082	U	U	0.089	U	U	0.088	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Surface Water Data

Validated 10/27/99
NEH, Inc.

Client Sample ID:	RINSE BLANK			RINSE BLANK			RINSE BLANK			RINSE BLANK			RINSE BLANK		
Lab Sample ID:	42547-2			42551-3			42562-3			42563-9			42563-14		
Sample Date:	06/17/99	Lab	DV	06/18/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/23/99	Lab	DV
Units	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.
Analyte-PCBs and Pesticides															
EPA Methods 8082 and 8081A															
Aroclor 1016	0.047	U	U	0.048	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1221	0.047	U	U	0.048	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1232	0.047	U	U	0.048	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1242	0.047	U	U	0.048	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1248	0.047	U	U	0.048	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1254	0.047	U	U	0.048	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1260	0.047	U	U	0.048	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Alpha-BHC	0.0094	U	U	0.0095	U	UJ	0.0080	U	U	0.0081	U	U	0.0087	U	U
Gamma-BHC	0.0094	U	U	0.0095	U	UJ	0.0080	U	U	0.0081	U	U	0.0087	U	U
Beta-BHC	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Delta-BHC	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Heptachlor	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Aldrin	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Heptachlor Epoxide	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Gamma Chlordane	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Alpha Chlordane	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Endosulfan I	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
4, 4'-DDE	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Dieldrin	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Endrin	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
4, 4'-DDD	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Endosulfan II	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
4, 4'-DDT	0.0094	U	U	0.0095	U	U	0.0080	U	UJ	0.0081	U	UJ	0.0087	U	UJ
Endrin Aldehyde	0.0094	U	U	0.0095	U	UJ	0.0080	U	UJ	0.0081	U	UJ	0.0087	U	UJ
Endosulfan Sulfate	0.0094	U	U	0.0095	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Methoxychlor	0.047	U	U	0.048	U	UJ	0.040	U	UJ	0.040	U	UJ	0.043	U	UJ
Endrin Ketone	0.0094	U	U	0.0095	U	UJ	0.0080	U	UJ	0.0081	U	UJ	0.0087	U	UJ
Toxaphene	0.094	U	U	0.095	U	U	0.080	U	U	0.081	U	U	0.087	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

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Industri-Plex, Wob..., MA
Reference Locations - Organic Surface Water Data

Validated 10/27/99
NEH, Inc.

Sample Location ID:	SD-01			SD-02			SD-02DUP		SD-03			SD-03DEEP		
Lab Sample ID:	42574-3			42574-1			42574-2		42551-1			42551-2		
Date Sampled:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.
Analyte-PCBs and Pesticides							Field Duplicate							
EPA Methods 8082 and 8081A														
Aroclor 1016	0.045	U	U	0.048	U	U	0.046	U	0.048	U	U	0.042	U	U
Aroclor 1221	0.045	U	U	0.048	U	U	0.046	U	0.048	U	U	0.042	U	U
Aroclor 1232	0.045	U	U	0.048	U	U	0.046	U	0.048	U	U	0.042	U	U
Aroclor 1242	0.045	U	U	0.048	U	U	0.046	U	0.048	U	U	0.042	U	U
Aroclor 1248	0.045	U	U	0.048	U	U	0.046	U	0.048	U	U	0.042	U	U
Aroclor 1254	0.045	U	U	0.048	U	U	0.046	U	0.048	U	U	0.042	U	U
Aroclor 1260	0.045	U	U	0.048	U	U	0.046	U	0.048	U	U	0.042	U	U
Alpha-BHC	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	UJ	0.0084	U	UJ
Gamma-BHC	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	UJ	0.0084	U	UJ
Beta-BHC	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Delta-BHC	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Heptachlor	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	UJ	0.0084	U	U
Aldrin	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Heptachlor Epoxide	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Gamma Chlordane	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Alpha Chlordane	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Endosulfan I	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
4, 4'-DDE	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Dieldrin	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Endrin	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
4, 4'-DDD	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Endosulfan II	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
4, 4'-DDT	0.0091	U	UJ	0.0095	U	UJ	0.0092	U	0.0095	U	U	0.0084	U	U
Endrin Aldehyde	0.0091	U	UJ	0.0095	U	UJ	0.0092	U	0.0095	U	UJ	0.0084	U	UJ
Endosulfan Sulfate	0.0091	U	U	0.0095	U	U	0.0092	U	0.0095	U	U	0.0084	U	U
Methoxychlor	0.045	U	UJ	0.048	U	UJ	0.046	U	0.048	U	UJ	0.042	U	UJ
Endrin Ketone	0.0091	U	UJ	0.0095	U	UJ	0.0092	U	0.0095	U	UJ	0.0084	U	UJ
Toxaphene	0.091	U	U	0.095	U	U	0.092	U	0.095	U	U	0.084	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Reference Locations - Organic Surface Water Data

Validated 10/27/99
NEH, Inc.

Sample Location ID:	SD-04			SD-12		
Lab Sample ID:	42547-1			42547-3		
Date Sampled:	06/17/99	Lab	DV	06/17/99	Lab	DV
Units	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.
Analyte-PCBs and Pesticides						
EPA Methods 8082 and 8081A						
Aroclor 1016	0.051	U	U	0.042	U	U
Aroclor 1221	0.051	U	U	0.042	U	U
Aroclor 1232	0.051	U	U	0.042	U	U
Aroclor 1242	0.051	U	U	0.042	U	U
Aroclor 1248	0.051	U	U	0.042	U	U
Aroclor 1254	0.051	U	U	0.042	U	U
Aroclor 1260	0.051	U	U	0.042	U	U
Alpha-BHC	0.010	U	U	0.0083	U	U
Gamma-BHC	0.010	U	U	0.0083	U	U
Beta-BHC	0.010	U	U	0.0083	U	U
Delta-BHC	0.010	U	U	0.0083	U	U
Heptachlor	0.010	U	U	0.0083	U	U
Aldrin	0.010	U	U	0.0083	U	U
Heptachlor Epoxide	0.010	U	U	0.0083	U	U
Gamma Chlordane	0.010	U	U	0.0083	U	U
Alpha Chlordane	0.010	U	U	0.0083	U	U
Endosulfan I	0.010	U	U	0.0083	U	U
4, 4'-DDE	0.010	U	U	0.0083	U	U
Dieldrin	0.010	U	U	0.0083	U	U
Endrin	0.010	U	U	0.0083	U	U
4, 4'-DDD	0.010	U	U	0.0083	U	U
Endosulfan II	0.010	U	U	0.0083	U	U
4, 4'-DDT	0.010	U	U	0.0083	U	U
Endrin Aldehyde	0.010	U	U	0.0083	U	U
Endosulfan Sulfate	0.010	U	U	0.0083	U	U
Methoxychlor	0.051	U	U	0.042	U	U
Endrin Ketone	0.010	U	U	0.0083	U	U
Toxaphene	0.10	U	U	0.083	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA

8260B Data Usability Review
VOC - Surface Water

IIIA. Review of Volatile Organic Data

1. Holding Times

Holding times and QC association with the samples are reviewed to ensure the accuracy of the reported results. The table on the following page (Table 1a) was completed to document the holding times and QC association.

Review the Volatile Organic Analysis Data Sheet.

Were the holding time requirements (surface waters analyzed within 14 days; and sediments analyzed within 7 and 14 days of sampling, for low-level and high-level preservation) met for each sample? Yes / **No**. If no, list below the affected samples and the number of days outside of holding time.

Action: If the holding times were slightly exceeded, estimate (J and UJ) positive and non-detect results. If the holding times were grossly exceeded (more than twice the allowed holding time), professional judgment should be used to determine the action necessary. Evaluation of screening, undiluted and dilution analyses, if available, should be made to determine the impact of the holding time violation on the data quality (e.g., whether or not positive values are estimated (J) and whether non-detected values should be estimated (UJ) or rejected (R)).

Comments:

All Analyses within HT - No Action Required.

Samples received & collected 6/21/99 - COC documents temp at 7°C. Samples collected in the summer - sent via courier to lab immediately after collection (same-day). Apparently samples didnot have a chance to cool-down completely upon receipt at lab. No Action taken. SDC 12/9/99

Table 1a. Holding Time and Associated QC Table

Sample Matrix: Water 17 Waters + 1 MS/MSD + 1 TB

Sample ID	Date/Time Sampled	Field Blank	Method* Blank	LCS*	MS/MSD	Date/Time Analyzed
SD04 (42547-1)	6/17/99 11:30	TB 6/18	B1062804 VBLK01	Q1062803	SD-03 MS/MSD	6/29 03:15
SD12 (42547-3)	6/17/99 13:18	42551-4		Q1062804		6/29 03:45
SD-13 (42547-4)	6/17 15:30					6/29 04:15
SD-03 (42551-1)	6/18 9:30		B1062902	Q1062901		6/30 00:25
SD-03MS (42551-1MS)	6/18 10:00			Q1062902		6/30 00:55
SD-03MSD (42551-1MSD)	6/18 10:30					6/30 01:25
SD-03 Deep (42551-2)	6/18 11:00					6/30 01:55
SD-06 (42551-5)	6/18 15:30					6/30 02:25
SD-07 Deep (-6)	6/18 16:30					6/30 02:55
SD-07 Shallow (-7)	6/18 16:30					6/30 03:25
SD-05 Deep (-8)	6/18 17:30					6/30 03:54
SD-05 Shallow (-9)	6/18 17:30					6/30 04:24
SD-2 (42594-1)	6/21/99		B1063002	Q1063001		6/30 19:24
SD-2 Dup (-2)	6/21			Q1063002		6/30 19:55
SD-01 (-3)	6/21					6/30 20:24
SD-10 (-4)	6/21					6/30 20:54
SD-11 (-5)	6/21					6/30 21:24
SD-8 (42575-1)	6/22/99		B1063002			6/30 21:53
SD-9 (-2)	6/22					6/30 22:23

* Lab called all MBs "VBLK01" + LCS as "VBLK01MS" + "VBLK01MSD" - therefore, Lab Sample ID used to distinguish these QC Samples.

2. GC/MS Instrument Performance Check

The BFB instrument performance checks (tunes) are reviewed to assess the accuracy and sensitivity of the results relative to instrument performance.

Review the tune summaries for BFB

Were all Method 8260B defined mass calibration and ion abundance criteria met for the BFB analyses? **Yes / No.** If no, list below the tune and affected samples.

Review the raw data for one tune. Did the laboratory obtain the BFB mass spectrum in a straight-forward manner (e.g., average of three scans centered across the BFB peak with background subtraction from a scan within 20 scans prior to the BFB scan)? **Yes / No.** If no, list below the method used to obtain the mass spectrum and the affected samples.

Were all samples analyzed within 12 hours of an acceptable tune? **Yes / No.** If no, list below the affected samples.

Action: If the mass assignment criteria were not met (e.g., base peak assigned to m/z 96 instead of m/z 95), reject (R) all associated data. If the ion abundance criteria were not met, sound technical judgment should be used in evaluating whether or not the data require estimation (U and UJ) or rejection (R) (e.g., the criteria requirements for the m/z 95/96, 174/175, 174/176 and 176/177 ratios are most important for proper tune while the relative abundances for m/z 50 and 75 are of lesser importance.)

Comments:

Single Scan, with no background correction, used to evaluate BFB - OK per 8260B. Form 5's have latest CLP SOW Tuning Criteria; however, raw data for Tune off instrument have the 8260B criteria - All tunes met 8260B criteria, even though the Form 5's have criteria that is different.

3. Initial Calibration

The initial calibration data are reviewed to determine if the standards were compliant with the method protocols.

Review the Initial Calibration Data Summary. Check and recalculate the RRFs, $\overline{RRF}$ and %RSD for at least one volatile analyte across the ICAL. Does the RRF and %RSD check back to the raw data? Yes / **No**. Were the RRFs for all analytes in the standard all greater than or equal to 0.05? **Yes** / **No**

Were at least five concentration levels of each compound analyzed during the initial calibration? **Yes** / **No**
Were all calibration standards analyzed within 12 hours of BFB tune? **Yes** / **No**

Was the lowest initial calibration standard at a concentration equivalent to the sample-specific reporting limit? **Yes** / **No** *

Were retention times for each target analyte stable across the calibration (i.e., minimum drift)? **Yes** / **No**

Did the initial calibration meet %RSD criteria of ≤ 30% for all analytes (surrogates and targets) across the calibration range? **Yes** / **No** - See page 4A-VOA

Did the initial calibrations meet %RSD criteria of ≤ 15% for target analytes and surrogates across the calibration range? **Yes** / **No** If no, was a calibration curve used for quantitation of results and was the correlation coefficient for the curve ≥ 0.99? **Yes** / **No** Was the curve forced through the origin? **Yes / No**
If no, list below all the affected samples. All analytes %RSD ≤ 15% except as noted on 4A-VOA

Action: If the %RSD >30% and average RRF ≥0.05, qualify positive and non-detected results as estimated (J and UJ). If the %RSD >30% and average RRF < 0.05 estimate positive results (J) and reject non-detected results (R). If the %RSD ≤ 30% and average RRF < 0.05 estimate positive results (J) and reject non-detected results (R). Sound technical judgment should be used in qualification of the data. The results for each sample associated with ICAL should be evaluated to determine if a result reported would be impacted by the mis-calibration. NCW 10/13/99

Comments:

ICAL Check: Compound Checked Benzene

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Avg. RRF	%RSD
Concentration	2ppb	5ppb	10ppb	50ppb	100ppb	200ppb		
Response Cpd	51722	133361	281845	1513148	2888418	5706932		
Conc, IS	50 ppb	50	50	50	50	50		
Response IS	115812	115561	114191	113974	114368	112378		
RRF	11.165	11.540	12.341	13.276	12.628	12.696	12.274	6.4

* All analytes except Acetone + Methylene Chloride run lowest at 2ppb - Acetone + MeCl2 lowest ICAL = 5 ppb

Additional Notes: ICAL - 8260B Continued

Bromomethane %RSD = 38.2%
Methylene chloride %RSD = 30.8%
All other target and surrogate %RSDs < 30%

For Bromomethane, eliminating the highest standard RRF resulted in %RSD = 28.1%.
For Methylene chloride, eliminating the lowest standard (5ppb) resulted in %RSD = 19.1%

None of the samples reported positive results for either Bromomethane or methylene chloride.

* Action: Based on Region I DV Guidance, the non-detected results for Methylene Chloride, ~~and Bromomethane~~ Nn in all Samples have been qualified as estimated (UJ) due to uncertainty in quantitation at the lowest ICAL concentration (RL).

No action taken to qualify Bromomethane non-detects since quantitation down at the RL was shown to be acceptable.

4. Continuing Calibration Check

The continuing calibration data are reviewed to determine if the standards were contractually compliant.

Review the Continuing Calibrations and Summaries. Check and recalculate the RRF and %Difference (%D) for at least one of the target volatile compounds in one of the CCALs. Does the RRF and %D check back to the raw data? Yes / No. Were the RRFs for all analytes in the standard all ≥ 0.05? Yes / No

Was a continuing calibration check performed every 12 hours following tuning verification of the instrument? Yes / No. If no, list below all the affected samples.

Were the target analytes recovered within the expected retention time window based upon the initial calibration (i.e., drift of instrument was acceptable)? Yes / No.

Did the continuing calibrations meet 8260B criteria for verification of %D ≤ ±25%? Yes / No If no, list below the outliers and the affected samples.

Action: If the %D > ± 25% and the CCAL RRF ≥ 0.05, estimate positive and non-detected results (J and UJ) for samples analyzed following this standard for the compound(s) that was outside of calibration. If the RRF <0.05 qualify positive results as estimated (J) and reject (R) non-detected results as unusable.

Comments:

6130 19a @ 15:54

CCAL Check: Standard ID C1063001.D : Compound Checked Toluene

Responses	RRF	avg. RRF ICAL	% Difference
Cpd: 712215	0.5425	0.501	-8.3% ✓
IS: 1312756			

CCAL 6/29 @ 00:13, Lab File ID C1062804.D, Chloromethane 32.5%D and Bromomethane -28.1%D ⇒ These two compounds in Samples SD04, SD12 and SD-13 have been qualified as estimated (UJ) due to CCAL Results.

CCAL 6/29 @ 18:20 missing from data package. Resubmittal 092999 Volatiles issued to obtain (see page 3A)

CCAL 6/30 @ 15:54 Lab File ID C1063001.D, Bromomethane %D = -54.6%; Chloroethane %D = -26.5%; Carbon Disulfide %D = -28.5% ⇒ None of these Compounds were detected in Samples

TION

* Action: For samples SD-2, SD-2DUP, SD-01, SD-10, SD-11, SD-8 and SD-9, the results for Bromomethane, Chloroethane,

Additional Notes:

Response to resubmittal received 9/29/99 via fax from lab -
Data Inserted in Data package

CCAL 6/29 @ 18:20 Bromomethane -37.4%D - All others ≤ ±25%D.
All RRFs > 0.05.

* Action: Bromomethane not detected in any sample => results (non-detected) qualified as estimated (UJ) for Sample SD-03; SD-03 Deep; SD-06, SD-07 Deep, SD-07 Shallow, SD-05 Deep + SD-05 Shallow + Trip Blank

5. Laboratory and Trip Blank Results

Laboratory and trip blank results are reviewed to assess the presence of contaminants, which affect the accuracy and sensitivity of the results. See Table 1a. where the Holding Time and Associated QC Table was completed for the samples within this SDG.

Was a Trip Blank associated with each sampling event for volatiles? **Yes** / **No** If no, list below affected samples. Only 1 TB from 6/18 - Sampling mistake which was subsequently addressed.

Was each sample analysis associated with the appropriate method blank, *ie*., correct matrix, correct matrix level, same batch? **Yes** / **No**. If no, list below affected samples.

Review the reporting forms for each method and trip blank. Were any target compounds in the method blanks detected at concentrations above the Reporting Limit (RL)? **Yes** / **No.** If yes, were methylene chloride, acetone or 2-butanone the only compounds reported above the RL? **Yes / No.** If yes, was methylene chlroide < 2.5 times the RL and 2-butanone and acetone < 5 times the RL? **Yes / No**

Action: - Blanks should not contain contaminants above the RL except for methylene chloride, acetone and 2-butanone which must not be present above 2.5-5 times the RL (see above). The Blank Action Level is defined as five times the highest level seen in any of the matrix-matched blanks associated with this SDG, except if methylene chloride, acetone or 2-butanone are present, in which case the Blank action is ten times the highest level observed for these compounds in any matrix-matched blank. The following actions should be taken if conditions warrant :

1. If the blank is not matrix matched, qualify all sample data, for the contaminant associated with this blank, with BB, TB or EB, as appropriate.
2. If the reported result in a sample is below the reporting limit (sample < RL) and if a matrix-matched blank contains a result above the quantitation limit (blank > RL), the result in the sample should be negated (U) and raised to the sample-specific RL for that sample
3. If the sample result is between the reporting limit and the blank Action Level (RL < sample < Action Level), the result for the sample is negated (U) at the level found in the sample. Based on the level of contamination suspected in the sample, the reporting limit may be elevated. Professional judgment will be used in assessing the action needed.
4. If the sample result is greater than the RL and the blank Action Level, no action is taken.

Comments:

Blanks evaluated: Trip Blank 6/18; VBLK01 B1062804; VBLK01 B1062902 + VBLK01 B1063002

Highest Blank: TB 6/18 Acetone 5J, Chloroform 1J; VBLK01 B1062902 3J methylene chloride

Action taken: No sample report methylene chloride or chloroform ⇒ No Action; Acetone Blank Action = 50 ug/L

Sample ID	Compound	Reported Result		Result based on Blank Action
SD-06	Acetone	2 ug/L (J)		5 ug/L U
SD-07 Deep	Acetone	5 ug/L (J)		5 U
SD-05 Shallow	Acetone	4 J		5 U
SD-02 Dup	Acetone	3 JB		5 U
SD-09	Acetone	4 JB		5 U

Additional Notes:

Note: Method Blank Associated with TB 6/18 analysis did not show Acetone or Chloroform => TB 6/18 results were reported without Blank Action.

Acetone reported at Trace concentrations in 5 Samples was negated and the Reported Value raised to the Acetone reporting Limit. Actions for blank action levels are not taken to qualify ~~on~~ Trip Blanks. [illegible] 10/25/99

(The 5 "rinsate" blanks are associated with the sediment samples.)

6A-VOA

6. Surrogate Spike Recoveries

The surrogate spike recoveries are reviewed to assess the accuracy of the results relative to laboratory performance and specific sample matrix.

Review the Surrogate Recovery information for each field and quality control sample. For one sample, verify that the recoveries reported correspond to the raw data and that the recovery calculation was done properly. Were the recovery data reported properly? **Yes** / **No**.

Were the *surrogate* recoveries within QAPP defined and method-generated accuracy limits? **Yes** / **No**. If no, were the affected samples reanalyzed? **Yes / No**. List below the affected samples.

Action - If one volatile surrogate recovery exceeds the upper limit, estimate (J) positive due to a potential high bias of the results; no action is required for non-detect results. If one volatile surrogate recovery is below the lower accuracy limit but above 10% recovery, estimate (J and UJ) the positive and non-detect results due to a potential low bias in the results. If any surrogate recovery is below 10%, reject (R) non-detect results and estimate positive results (J) due to potential false negatives and low bias in the results, respectively.. List below the affected samples and required actions.

Comments:

Lab used different Surrogates than given in QAPP (OK by Method 8260B) -
Lab used Toluene-d8, Dibromofluoromethane & 4-Bromofluorobenzene
QAPP - Toluene-d8, 1,2-Dichloroethane-d4 & 4-Bromofluorobenzene ⇒
2 Surrogates the Same, 1 different. QC limits were lab generated (as required by Method 8260B) and were actually tighter than limits in QAPP.

? Dibromofluoromethane in Sample 42551-5 (SD-06) checked from Raw to final - %Rec calculated Correctly
(Conc. DFM = $\frac{353235 \times 50}{82189 \times 4.221}$ = 50.91 µg/L; 50 µg/L spike ⇒ %Rec = 101.8%)

No Action Required - all Surrogates within criteria (both Lab + QAPP)

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

The matrix spike/matrix spike duplicate (MS/MSD) recoveries are reviewed to assess the accuracy of the results relative to the specific sample matrix and the relative percent differences (RPDs) are reviewed to assess the precision of the results relative to the specific sample matrix.

Review the unspiked sample, Matrix Spike, and Matrix Spike Duplicate (MS/MSD) raw data and recovery results. Were the recoveries for the MS/MSD calculated properly? **Yes / No.**

Did the laboratory perform MS/MSDs for each matrix and matrix level analyzed for each analytical batch prepared for analysis? **Yes / No.** If no, list below the affected samples.

Were the MS/MSD recoveries and precision within QAPP and method-generated accuracy limits? **Yes / No.** Were the RPDs between the MS/MSD within the QAPP precision criteria? **Yes / No.** If no, list below the affected compounds.

Was the %RSD for non-spiked compounds in the unspiked sample, MS and MSD ≤ 50%? **Yes / No / NA**

Action: No action is taken to the entire data set based on MS/MSD results alone. The unspiked sample may be qualified based on MS/MSD results as follows: if the MS/MSD recoveries were greater than the upper accuracy limit, estimate (J) positive results due to potential high bias; no action is required for non-detect results; if the MS/MSD recoveries were below the lower accuracy limit but above 10%, estimate (J and UJ) positive and non-detect results due to potential low bias; if a MS/MSD compound was recovered below 10%, estimate (J) positive results due to potential low bias and evaluate the non-detected results to determine whether estimation (UJ) or rejection (R) of the unspiked sample data is warranted. If the RPD between the MS and MSD > QAPP criteria, estimate (J and UJ) positive and non-detected results in the unspiked sample. If the %RSD, for a non-spiked compound, between the unspiked sample, MS, and MSD >50%, estimate (J) positive results and use professional judgement to qualify other detected and non-detected analytes.

Comments: Unspiked Sample = SD-03 - All Results ND for Sample.
Lab used Lab generated %Rec QC Criteria for MS Compounds. The QC criteria used was reasonable relative to QAPP criteria + in most cases tighter than used in QAPP. % Rec + %RPDs all within Lab limits and QAPP Limits -
No Action Required.

8. Laboratory Control Sample and Standard Reference Material Analysis

The Laboratory Control Samples (LCS) and/or Standard Reference Material (SRM) are reviewed to assess the accuracy of the results relative to the analytical procedure.

Review the raw data and recovery information for the LCS/SRM .

Did the laboratory perform a LCS or SRM for each matrix and matrix level analyzed? Yes / No. If no, list below the affected samples.

Were the LCS or SRM recoveries within QAPP and method-generated accuracy requirements for recovery? Yes / No. If no, list below the affected compounds.

Action: . If the LCS or SRM recoveries are above criteria, estimate (J) positive results due to potential high bias, no qualification of non-detected results is necessary. If the LCS or SRM recoveries are between 10% and the lower recovery limit, estimate (J and UJ) positive and non-detect results for the samples associated with the analytical batch due to potential low bias in the results. If the recovery in the LCS or SRM is less than 10%, estimate (J) positive results due to low bias and reject (R) non-detect results due to potential false negatives.

Comments: Lab performed LCS + LCSD (Called VBLK01MS + VBLK01MSD)
Full Spike less Ketones and CS2 used for LCS'.
Recoveries + RPDs for 3 sets of LCS/LCSD were within Lab + QAPP criteria

No Action Required.

9. Internal Standards

The Internal Standard (IS) response in the samples and standards is evaluated to ensure that the analytical system was in control during analysis.

Were the IS areas for each sample and standard analyzed within -50 to + 100% of the continuing calibration? Yes/No. Were the retention times for the IS within ±30 seconds from the retention time established in the continuing calibration? Yes / No.

Action: If an IS area is greater than +100% compared to the continuing calibration, qualify positive results as estimated (J), non-detects do not require action. If the IS area is below -50% but not lower than -80%, estimate positive and non-detected results (U and UJ). If the area drop off or retention time shift for the IS is too severe (>-80%), non-detected results may require rejection (R). Professional judgment must be used in evaluating the data associated with poor IS performance.

Comments:

All IS Areas + RTs met criteria

No Action Required.

10. Sample Quantitation Limits

Review raw data and reporting forms. Did the sample-specific RLs meet the QAPP criteria? **Yes/No.** Did the laboratory accurately adjust sample reporting limits to account for sample specific preparation and analysis conditions? **Yes / No.**

Were all components reported in the samples quantitated within the calibration region of the instrument for the detected analytes? **Yes/No** Were the relative retention times for all components reported within the retention time windows established during initial calibration? **Yes/No**

If the sample analyses were performed at dilutions, were more concentrated analyses performed or was sample screening information included in the data package? **Yes / No.** NA No Dilutions

Were sample dilutions appropriate relative to scaling of the chromatograms and the calibration levels employed (e.g., peaks of interest within upper half of the chromatogram and quantitation done within the calibration range)? **Yes / No.** NA No Dilutions

Action - If the quantitation limits for non-detect results are lower than the lowest calibration standard, or if a positive result is detected outside of the calibration range, estimate positive and non-detected results (J and UJ).

Comments:

Lab didn't Analyze Acetone and Methylene Chloride at 2ppb - lowest ICAL standard for these two components was 5ppb. All other Components analyzed at 2 ppb => All Components except Acetone + Methylene Chloride were at QAPP RL.
- The RLs for Acetone + Methylene chloride were correctly reported at 5 µg/L.

No Action Required

11. Field Duplicate Precision

Field duplicate samples are reviewed to assess representativeness of the sample aliquot to the area sampled and the precision of the results relative to field sampling techniques.

Review analytical results for the duplicate sample analyses.

Action: If field duplicate precision exceeded 30% RPD for aqueous samples or 50% RPD for sediment samples for any compound, estimate (J and UJ) positive and non-detect results for the affected compounds in both samples. If severe imprecision was noted in the field duplicate sample (i.e., RPD >100%), qualify the remainder of the associated field sample data based on sound technical judgment.

Comments:

Field Duplicate Samples: SD-2 SD-2 DUP

Results for Both Samples were non-detect for all analytes, therefore field duplicate precision could not be assessed.

12. Additional QA/QC Issues

Were the percent solids for the samples >30%. **Yes / No** NA.

The sampling for volatile sediment samples was modified from Method 5035 in an attempt to appropriately deal with sediments with very low solids content (<30%). As such, the low-level preservation technique required sampling approximately 5g of sediment and placing the sample under 5mL of water (method 5035 suggests a 1:2 ratio of soil to water). The medium- or high-level preservation technique also required 1:1 methanol to sample preservation. Therefore, while Region I data validation guidelines require that data be estimated (J) and/or rejected (R) based on low %solids content of the samples, no action was taken to qualify sediment sample results based on solids content for this project.

List any additional issues which may affect the quality of the results. List the affected samples, QA/QC issue, and necessary actions taken in the comments section below.

Lab sequence sheets show pH <2 for all samples - this is done in lab during analysis.

- Date of sampling incorrect for several samples in the Database Excel file (Date received used instead of sampling date) ⇒ During assessment these data were corrected in the DB file.

IVA. Example Sample Calculations

Review of one sample per data package is performed to determine if sample results and quantitation limits were correctly calculated and reported.

Sample ID: SD-07 Deep was selected for review in this data package.

A. Form 1 Review

1. Were the Form 1s for completed according to the method/QAPP requirements? Yes / No. If no, list below the affected fields.

2. Reproduce the reporting limit for VOC in one of the samples, did the laboratory correctly calculate the quantitation limits? Yes / No. If no, list below. DF=1 ; RL=2 µg/L ✓

B. Quantitation Review

Reproduce a calculation for one volatile analyte in one of the samples that contained a positive result and compare the calculated result to the result reported by the laboratory.

Analyte Checked: Benzene

Laboratory Result: 63 µg/L Calculated Result: 63 µg/L ✓

Example Calculation: 5 mL purge of Std + Sample

Benzene Response = 1279083

IS Response = 82185 @ 50ppb

$\overline{RRF}$ Benzene = 12.274

$$\text{Conc. Benzene} = \frac{1279083 \times 50}{82185 \times 12.274} = 63.4\ \mu g/L$$

Industriplex, Woburn, MA –

SVOC - Surface Water

IIIB. Review of Semivolatile Organic Data

1. Holding Times

Holding times and QC association with the samples are reviewed to ensure the accuracy of the reported results. The table on the following page (Table 1a) was completed to document the holding times and QC association.

Review the Semivolatile Organic Analysis Data Sheet.

Were the holding time requirements (surface waters extracted within 7 days; sediment and biota extracted within 14 days of sampling (or of thawing for biota) and extracts analyzed within 40 days of preparation) met for each sample? Yes / No. If no, list below the affected samples and the number of days outside of holding time.

Action: If the holding times were slightly exceeded, estimate (J and UJ) positive and non-detect results. If the holding times were grossly exceeded (more than twice the allowed holding time), professional judgment should be used to determine the action necessary. Evaluation of screening, undiluted and dilution analyses, if available, should be made to determine the impact of the holding time violation on the data quality (e.g., whether or not positive values are estimated (J) and whether non-detected values should be estimated (UJ) or rejected (R)).

Comments:

All HTs met, no action required.

Samples received 6/21/99 at 7°C.
No Action - see explanation pg 1-VOA.

12/9/99

Table 1a. Holding Time and Associated QC Table

Sample Matrix: Water 17 Waters + 1 ms/msD + 4 RB

Sample ID	Date/Time Sampled	Field Blank	Method* Blank	LCS		Date/Time Extracted	Date/Time Analyzed
SD04 (42547-1)	6/17/99 11:30	RB 6/17	SW0623B1	SW0623L1		6/23/99	7/8/99
SD12 (42547-3)	6/17/99 13:18	(42547-2)					
SD-13 (42547-4)	6/17 15:30						
SD-03 (42551-1)	6/18 9:30	RB 6/18					7/9/99
SD-03 ms (42551-1ms)	6/18 10:00	(42551-3)					
SD-03 msD (42551-1msD)	6/18 10:30						
SD-03 Deep (42551-2)	6/18 11:00						
SD-06 (42551-5)	6/18 15:30						
SD-07 Deep (-6)	6/18 16:30						
SD-07 Shallow (-7)	6/18 16:30						
-05 Deep (-8)	6/18 17:30						
SD-05 Shallow (-9)	6/18 17:30						
SD-2 (42574-1)	6/21	RB 6/21	SW0628B1	SW0628L1		6/28/99	
SD-2 Dup (-2)	6/21	(42562-3)					
SD-01 (-3)	6/21						
SD-10 (-4)	6/21						
SD-11 (-5)	6/21						
SD-8 (42575-1)	6/22/99	RB 6/22					
SD-9 (-2)	6/22	(42563-9)					

* Lab called all method Blks, SBLK01, therefore Lab Sample ID used instead.

2. GC/MS Instrument Performance Check

The DFTPP instrument performance checks (tunes) are reviewed to assess the accuracy and sensitivity of the results relative to instrument performance.

Review the tune summaries for DFTPP

Were all Method 8270C defined mass calibration and ion abundance criteria met for the DFTPP analyses? Yes / No. If no, list below the tune and affected samples.

Review the raw data for one tune. Did the laboratory obtain the DFTPP mass spectrum in a straight-forward manner (e.g., average of three scans centered across the DFTPP peak with background subtraction from a scan within 20 scans prior to the DFTPP scan)? Yes / No. If no, list below the method used to obtain the mass spectrum and the affected samples.

Were all samples analyzed within 12 hours of an acceptable tune? Yes / No. If no, list below the affected samples.

Action: If the mass assignment criteria were not met (e.g., base peak assigned to m/z 199 instead of m/z 198), reject (R) all associated data. If the ion abundance criteria were not met, sound technical judgment should be used in evaluating whether or not the data require estimation (U and UJ) or rejection (R) (e.g., the criteria requirements for the m/z 198/199 and 442/443 ratios and relative abundances of m/z 68, 70, 197, and 441 are most important for proper tune while the relative abundances for m/z 51, 127 and 275 are of lesser importance.)

Comments:

The Form 5's (Tune Summary) have latest SOW CLP Criteria which are not the same as Method 8270C - The raw tune summary off the Instrument does have the 8270C Tune criteria (i.e., lab did use 8270C criteria for Tune + Tunes all met that criteria even though the Form 5 criteria shown were not 8270C).

No Action Required.

4. Initial Calibration

The initial calibration data are reviewed to determine if the standards were compliant with the method protocols.

Review the Initial Calibration Data Summary. Check and recalculate the RRFs, $\overline{RRF}$ and %RSD for at least one polynuclear aromatic hydrocarbon (PAH) analyte across the ICAL. Does the RRF and %RSD check back to the raw data? Yes / No. Were the RRFs for all analytes in the standard all greater than or equal to 0.05? Yes / No

Were at least five concentration levels of each compound analyzed during the initial calibration? Yes / No
Were all calibration standards analyzed within 12 hours of DFTPP tune? Yes / No

Was the lowest initial calibration standard at a concentration equivalent to the sample-specific reporting limit? Yes / No - Yes for all but hexachlorocyclopentadiene - See page 419 - SVOC

Were retention times for each target analyte stable across the calibration (i.e., minimum drift)? Yes / No

Did the initial calibration meet %RSD criteria of ≤ 30% for all analytes (surrogates and targets) across the calibration range? **Yes / No.**

Did the initial calibrations meet %RSD criteria of ≤ 15% for target analytes and surrogates across the calibration range? **Yes / No.** If no, was a calibration curve used for quantitation of results and was the correlation coefficient for the curve ≥ 0.99? **Yes / No** Was the curve forced through the origin? **Yes / No** If no, list below all the affected samples.

Action: If the %RSD >30% and average RRF ≥0.05, qualify positive and non-detected results as estimated (J and UJ). If the %RSD >30% and average RRF < 0.05 estimate positive results (J) and rejecy non-detected results (R). If the %RSD ≤ 30% and average RRF < 0.05 estimate positive results (J) and reject non-detected results (R). Sound technical judgment should be used in qualification of the data. The results for each sample associated with ICAL should be evaluated to determine if a result reported would be impacted by the mis-calibration.

Comments:

ICAL Check: Compound Checked Phenanthrene

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Avg. RRF	%RSD
Concentration	2 µg/mL	5 µg/mL	10 µg/mL	15 µg/mL	20 µg/mL	40 µg/mL		
Response Cpd	718959	1916770	3560431	5644786	8412079	13035168		
Conc, IS	10 µg/mL	10 µg/mL	10 µg/mL	10 µg/mL	10 µg/mL	10 µg/mL		
Response IS	2883392	3198791	2999192	3279991	3079877	3046986		
RRF	1.247	1.198	1.187	1.147	1.366	1.070	1.202	8.3

Additional Notes:

* 2,4-Dinitrophenol RRF in 5 ng/mL standard was 0.012 with $\overline{RRF}$ = 0.133 and %RSD = 72.2%. All other RRFs >0.05 - elimination of lowest ICAL RRF (5ppm) resulted in %RSD = 48.2%

Action: 2,4-Dinitrophenol qualified as estimated (UJ) in all samples (compound was not detected in any sample)

* Hexachlorobutadiene - %RSD = 33.0% - Elimination of lowest ICAL (15ppm) gave %RSD = 22.6%

Action: Compound not reported for any sample => results for hexachlorobutadiene qualified as estimated (UJ)

* 4,6-Dinitro-2-methylphenol - %RSD = 36.1%. Elimination of lowest ICAL (5ppm) gave %RSD = 21.0%

Action: Compound not reported for any sample => results for 4,6-Dinitro-2-methylphenol qualified as estimated (UJ)

* Hexachlorocyclopentadiene lowest ICAL was 5ppm which on a sample-equivalent basis would result in a reporting limit of 10 µg/L. Lab reported data at 4 µg/L RL as if the lowest ICAL std was 2 ppm.

Action: Nominal Reporting Limit for Hexachlorocyclopentadiene was raised from 4 ppb to 10 ppb (on a sample specific basis) for all samples. Sample-specific reporting limits vary from 10 to ~~12~~ 13 ug/L (ppb) due to sample volume ml ~~weights~~ (factors).

volume

SC 10/27/99

SC 10/27/99

5. Continuing Calibration Check

The continuing calibration data are reviewed to determine if the standards were contractually compliant.

Review the Continuing Calibrations and Summaries. Check and recalculate the RRF and %Difference (%D) for at least one of the PAH in one of the CCALs. Does the RRF and %D check back to the raw data? Yes / No. Were the RRFs for all analytes in the standard all ≥ 0.05? Yes / No

Was a continuing calibration check performed every 12 hours following tuning verification of the instrument? Yes / No. If no, list below all the affected samples.

Were the target analytes recovered within the expected retention time window based upon the initial calibration (i.e., drift of instrument was acceptable)? Yes / No.

Did the continuing calibrations meet 8270C criteria for verification of %D ≤ ±25%? Yes / No. If no, list below the outliers and the affected samples.

Action: If the %D > ± 25% and the CCAL RRF ≥ 0.05, estimate positive and non-detected results (J and UJ) for samples analyzed following this standard for the compound(s) that was outside of calibration. If the RRF <0.05, qualify positive results as estimated (J) and reject (R) non-detected results as unusable.

Comments:

CCAL Check: Standard ID C070801.D : Compound Checked Chrysene

Responses	RRF	avg. RRF ICAL	% Difference
Cpd: 3091467	~~1.246~~ 1.202	1.246	3.5 ✓
IS: 2570749 @ 10	[illegible]		

- CCAL 7/8/99 @ 19:43 (File C07081.D) - Hexachlorocyclopentadiene %D = 37.7% - All others OK (≤ ±25%)

* Action: Results for Sample SD04, RB 6/17/99 (42547-2), SD-12, SD-13, SD-03, SD-03 Deep, RB 6/18/99 (42551-3), SD-06, SD-07 Deep, SD 07 Shallow, SD05 Deep + SD-05 Shallow qualified as estimated (UJ) for Hexachlorocyclopentadiene.

- CCAL 7/9/99 @ 13:14 (file C070901.D) - 2,4-Dinitrophenol %D = 25.6% - All others OK.

* Action: Results for Sample RB 6/21/99 (42562-3), RB 6/22/99 (42563-4), RB 6/23/99 (42563-14), SD02, SD-2 DUP, SD-01, SD-10, SD-11, SD-08 + SD-09 qualified as estimated (UJ) for 2,4-Dinitrophenol

5. Laboratory and Field Blank Results

Laboratory and field blank results are reviewed to assess the presence of contaminants, which affect the accuracy and sensitivity of the results. See Table 1a. where the Holding Time and Associated QC Table was completed for the samples within this SDG.

Was each sample analysis associated with the appropriate method blank, *ie.*, correct matrix, correct matrix level, same extraction batch? Yes / No. If no, list below affected samples.

No compounds detected in method blanks. Field result blanks were for sediments only.

Review the reporting forms for each method and field blank. Were any target compounds in the method blanks detected at concentrations above the Reporting Limit (RL)? Yes / No. If yes, were these compounds phthalates and were they reported at < 5 times the RL? Yes / No - ~~Yes for all but RB 6/22 (42563-9) with Di-n-butyl phthalate at 24 ug/L with RL = 4 ug/L (6x)~~

HC 12/9/99

Action: - Blanks should not contain contaminants above the RL except for phthalates that must not be present above 5 times the RL. The Blank Action Level is defined as five times the highest level seen in any of the matrix-matched blanks associated with this SDG, except if phthalates are present, in which case the Blank action is ten times the highest level observed in any matrix-matched blank. The following actions should be taken if conditions warrant :

5. If the blank is not matrix matched, qualify all sample data, for the contaminant associated with this blank, with BB or EB, as appropriate.
6. If the reported result in a sample is below the reporting limit (sample < RL) and if a matrix-matched blank contains a result above the quantitation limit (blank > RL), the result in the sample should be negated (U) and raised to the sample-specific RL for that sample
7. If the sample result is between the reporting limit and the blank Action Level (RL < sample < Action Level), the result for the sample is negated (U) at the level found in the sample. Based on the level of contamination suspected in the sample, the reporting limit may be elevated. Professional judgment will be used in assessing the action needed.
8. If the sample result is greater than the RL and the blank Action Level, no action is taken.

RB 6/19 (42547-2); RB 6/18 (42551-3); RB 6/21 (42562-3) + RB 6/22 (42563-9)

Comments:

Blanks evaluated: SW0623B1 + SW0628B1 - All ND. RBs have trace - > RL except 42551-3 which is ND.

Highest Blank: Di-n-butyl phthalate only detected in RBs 6/17, 6/21 + 6/22
6 ug/L 24 ug/L

Action taken:
No Action Required since none of the samples reported Di-n-butyl phthalate as detected.

HC 12/9/99

Sample ID	Compound	Reported Result	Result based on Blank Action

No rinsate blanks were associated with the surface water samples.

6. Surrogate Spike Recoveries

The surrogate spike recoveries are reviewed to assess the accuracy of the results relative to laboratory performance and specific sample matrix.

Review the Surrogate Recovery information for each field and quality control sample. For one sample, verify that the recoveries reported correspond to the raw data and that the recovery calculation was done properly. Were the recovery data reported properly? Yes / No.

Were the surrogate recoveries within QAPP defined and method-generated accuracy limits? Yes / No. If no, were the affected samples reanalyzed? Yes / No. List below the affected samples.
- See below.

Action - If two Base/Neutral (BN) or two Acid surrogate recoveries exceed the upper limit, estimate (J) positive results (for the fraction affected) due to a potential high bias of the results; no action is required for non-detect results. If two BN or 2 Acid surrogate recoveries are below lower accuracy limit but above 10% recovery, estimate (J and UJ) the positive and non-detect results, for the affected fraction, due to a potential low bias in the results. If any surrogate recoveries are below 10%, reject (R) non-detect results and estimate positive results (J) due to potential false negatives and low bias in the results, respectively.. List below the affected samples and required actions.

Comments: Lab spiked only BN Surrogates since this was how they had spiked sediment samples. NCR contacted lab on 8/16/99 questioning why only BN Surrogates used and an Addendum 1 to narrative was issued. Lab advised that in future, all Water analyses for SVOC MUST have full Surrogate Spikes (only BN used since for Sediments the extraction for SVOC, Pesticides + PCBs are done from a single sample aliquot and the acid surrogates will interfere with ECD analysis). Surrogate spiking protocol for sediments discussed with Andy Beliveau on 9/28/99 + Andy advised NCR to use LCS + MS/MSD information, if necessary, to qualify acid compounds (i.e., don't estimate acid results unless other QC shows problems with acids). For this 1 Surface Water SDG, this protocol for using LCS + MS/MSD information to evaluate Acid Compounds will also be used.

> LCS + MS/MSD % Recoveries for all Acid compounds acceptable
> All BN Surrogates OK except for Sample SD-11.

- Sample SD-11 reported all three BN Surrogates > Upper Recovery limit (lab narrative indicates that lab believes a double spike of surrogate added during extraction since all other samples in [illegible]

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

The matrix spike/matrix spike duplicate (MS/MSD) recoveries are reviewed to assess the accuracy of the results relative to the specific sample matrix and the relative percent differences (RPDs) are reviewed to assess the precision of the results relative to the specific sample matrix.

Review the unspiked sample, Matrix Spike, and Matrix Spike Duplicate (MS/MSD) raw data and recovery results. Were the recoveries for the MS/MSD calculated properly? **Yes / No.**

Did the laboratory perform MS/MSDs for each matrix and matrix level analyzed for each analytical batch prepared for analysis? **Yes / No.** If no, list below the affected samples.

Were the MS/MSD recoveries and precision within QAPP and method-generated accuracy limits? **Yes / No.** Were the RPDs between the MS/MSD within the QAPP precision criteria? **Yes / No.** If no, list below the affected compounds.

Was the %RSD for non-spiked compounds in the unspiked sample, MS and MSD ≤ 50%? **Yes / No / NA**

Action: No action is taken to the entire data set based on MS/MSD results alone. The unspiked sample may be qualified based on MS/MSD results as follows: if the MS/MSD recoveries were greater than the upper accuracy limit, estimate (J) positive results due to potential high bias; no action is required for non-detect results; if the MS/MSD recoveries were below the lower accuracy limit but above 10%, estimate (J and UJ) positive and non-detect results due to potential low bias; if a MS/MSD compound was recovered below 10% or not at all, estimate (J) positive results due to potential low bias and evaluate the non-detected results to determine whether estimation (UJ) or rejection (R) of the unspiked sample data is warranted. If the RPD between the MS and MSD > QAPP criteria, estimate (J and UJ) positive and non-detected results in the unspiked sample. If the %RSD, for a non-spiked compound, between the unspiked sample, MS, and MSD >50%, estimate (J) positive results and use professional judgement to qualify other detected and non-detected analytes.

Comments: Lab Limits = QAPP Limits.

MS/MSD on SD-03 (unspiked Sample was ND for all analytes)

% Rec + RPD for MS/MSD met QAPP Criteria -

No Action Required.

8. Laboratory Control Sample and Standard Reference Material Analysis

The Laboratory Control Samples (LCS) and/or Standard Reference Material (SRM) are reviewed to assess the accuracy of the results relative to the analytical procedure.

Review the raw data and recovery information for the LCS/SRM .

Did the laboratory perform a LCS or SRM for each matrix and matrix level analyzed? **Yes** / **No**. If no, list below the affected samples.

Were the LCS or SRM recoveries within QAPP and method-generated accuracy requirements for recovery? **Yes** / **No**. If no, list below the affected compounds.

Action: . If the LCS or SRM recoveries are above criteria, estimate (J) positive results due to potential high bias, no qualification of non-detected results is necessary. If the LCS or SRM recoveries are between 10% to the lower recovery limit, estimate (J and UJ) positive and non-detect results for the samples associated with the analytical batch due to potential low bias in the results. If the recovery in the LCS or SRM is less than 10%, estimate (J) positive results due to low bias and reject (R) non-detect results due to potential false negatives.

Comments: SW0623L1 + SW0628L1

All Criteria for LCS Met - no Action Required.

9. Internal Standards

The Internal Standard (IS) response in the samples and standards is evaluated to ensure that the analytical system was in control during analysis.

Were the IS areas for each sample and standard analyzed within -50 to + 100% of the continuing calibration? Yes/No. Were the retention times for the IS within ±30 seconds from the retention time established in the continuing calibration? **Yes** / **No.**

Action: If an IS area is greater than +100% compared to the continuing calibration, qualify positive results as estimated (J), non-detects do not require action. If the IS area is below -50% but not lower than -80%, estimate positive and non-detected results (U and UJ). If the area drop off or retention time shift for the IS is too severe (>-80%), non-detected results may require rejection (R). Professional judgment must be used in evaluating the data associated with poor IS performance.

Comments:

IS Areas + RTs all met criteria -

No Action Required.

10. Sample Quantitation Limits

Review raw data and reporting forms. Did the sample-specific RLs meet the QAPP criteria? Yes/No. Did the laboratory accurately adjust sample reporting limits to account for sample specific preparation and analysis conditions? Yes/No.

Were all components reported in the samples quantitated within the calibration region of the instrument for the detected analytes? Yes/No Were the relative retention times for all components reported within the retention time windows established during initial calibration? Yes/No

If the sample analyses were performed at dilutions, were more concentrated analyses performed or was sample screening information included in the data package? Yes / No/ NA - No dilutions

Were sample dilutions appropriate relative to scaling of the chromatograms and the calibration levels employed (e.g. peaks of interest within upper half of the chromatogram and quantitation done within the calibration range)? Yes / No. NA - No Dilutions

Action - If the quantitation limits for non-detect results are lower than the lowest calibration standard, or if a positive result is detected outside of the calibration range, estimate positive and non-detected results (J and UJ).

Comments: Lab's lowest ICAL standard was at 2 ug/mL, which assuming 1 L extraction to a final volume of 2 mL (as was done) leads to sample-specific RL = 4 ug/L. QAPP required RL was 5 ug/L for most SVOC with 8 Aniline, Phenols + 2,6-Dinitrotoluene at 12 ug/L. Therefore, Lab's RLs generally < QAPP required RLs with the following exceptions:

- Hexachlorocyclopentadiene lowest ICAL was at 5 ug/mL => RL = 10 ug/mL if 1 L extracted to 1 mL; QAPP RL for this compound was 5 ug/L => RL reported high by a factor of 2 (Results changed - see page 4A-SVOC)
- 3-Nitroaniline QAPP RL = 5 ug/L, Lab reported 10 ug/L - ICAL indicates lowest ICAL for 3-Nitroaniline was 2 ug/mL => RL reported too High

* Action - RL for 3-Nitroaniline lowered to 4 ug/L on sample-specific basis to correlate with ICAL and QAPP requirements.

(RL Ranges from 4 to 5 ug/L on a sample-specific basis).

continued on page 11A-SVOC

Additional Notes:

Due to limited Sample Volume for extraction the following compounds in the following samples were reported above the QAPP RL

Compound	QAPP RL	~~SD02~~	SD-2DUP	SD-01	SD-11
2,4-Dinitrophenol	12 ug/L	13 ug/L	13 ug/L	13 ug/L	13 ug/L
4-Nitrophenol	12 ug/L	13	13	13	13
4,6-Dinitro-2-methylphenol	12 ug/L	13	13	13	13
Pentachlorophenol	12 ug/L	13	13	13	13
2,4,5-Trichlorophenol	12 ug/L	13	13	13	13
~~2-Nitrophenol~~ NCE 9/29/99					
2-Nitroaniline	12 ug/L	13	13	13	13
4-Nitroaniline	12 ug/L	13	13	13	13
Volume extracted		760 mL	750 mL	760 mL	770 mL

All other RLs, except as noted for hexachlorocyclopentadiene, met QAPP criteria (were lower or at QAPP RLs).

11. Field Duplicate Precision

Field duplicate samples are reviewed to assess representativeness of the sample aliquot to the area sampled and the precision of the results relative to field sampling techniques.

Review analytical results for the duplicate sample analyses.

Action: If field duplicate precision exceeded 30% RPD for aqueous samples or 50% RPD for sediment or biota samples for any compound, estimate (J and UJ) positive and non-detect results for the affected compounds in both samples. If severe imprecision was noted in the field duplicate sample (i.e., RPD >100%), qualify the remainder of the associated field sample data based on sound technical judgment.

Comments:

Field Duplicate Samples: SD-2 SD-2 DUP

All analytes in both samples were non-detects ⇒ Field duplicate precision could not be assessed.

12. Additional QA/QC Issues

Were the percent solids for the samples >30%. **Yes / No / NA**

List any additional issues which may affect the quality of the results. List the affected samples, QA/QC issue, and necessary actions taken in the comments section below.

Action: If the %solids were between 10% and 30%, qualify positive results as estimated (J) and reject non-detected results (R). If the %solids were < 10%, reject (R) positive and non-detected results.

No additional issues noted other than Sampling Date on Database Excel file for several samples incorrect. The correct date was added to the excel files.

IVB. Example Sample Calculations

Review of one sample per data package is performed to determine if sample results and quantitation limits were correctly calculated and reported.

Sample ID: SD-05 Deep was selected for review in this data package.

A. Form 1 Review

1. Were the Form 1s for completed according to the method/QAPP requirements? Yes No. If no, list below the affected fields.

2. Reproduce the reporting limit for SVOC in one of the samples, did the laboratory correctly calculate the quantitation limits? Yes No. If no, list below. Base RL = 4 μg/L

∴ Sample RL = $4 \times \frac{1000}{920} = 4.3$ μg/L
= 4 μg/L ✓

C. Quantitation Review

Reproduce a calculation for one semivolatile analyte in one of the samples that contained a positive result and compare the calculated result to the result reported by the laboratory.

Analyte Checked: Phenol

Laboratory Result: 5 μg/L Calculated Result: 5 μg/L

Example Calculation: 920 mL extracted to 2 mL final volume; DF=1

Phenol Response = 309930 IS Resp = 690707 @ 10 μg/mL
$\overline{RRF}$ Phenol = 1.956

Concentration Phenol = $\frac{309930 \times 10}{690707 \times 1.956} \times \frac{2000 \mu L}{920 mL} = 4.99$
= 5 μg/L

Industri-Plex, Woburn, MA

8081A and 8082 Data Usability Review

IIIC. Review of Data

Pest/PCB - Surface Water

1. Holding Times

Holding times and QC association with the samples are reviewed to ensure the accuracy of the reported results. The table on the following page (Table 1a) was completed to document the holding times and QC association.

Review the Pesticide and Aroclor Data Sheets.

Were the holding time requirements (surface waters extracted within 7 days; sediment and biota extracted within 14 days of sampling (or thawing for biota) and extracts analyzed within 40 days of preparation) met for each sample? Yes / No. If no, list below the affected samples and the number of days outside of holding time.

Action: If the holding times were slightly exceeded, estimate (J and UJ) positive and non-detect results. If the holding times were grossly exceeded (more than twice the allowed holding time), professional judgment should be used to determine the action necessary. Evaluation of screening, undiluted and dilution analyses, if available, should be made to determine the impact of the holding time violation on the data quality (e.g., whether or not positive values are estimated (J) and whether non-detected values should be estimated (UJ) or rejected (R)).

Comments:

All HTs met - no action required.

Samples received 6/21/99 at 7°C. See note pg 1-VOA. No Action. DC 12/9/99

Table 1a. Holding Time and Associated QC Table

Sample Matrix: Water - 17 Waters + 1 MS/MSD + 4 RB

Sample ID	Date/Time Sampled	Field Blank	Method Blank	LCS	Date/Time Extracted	Date/Time Analyzed
SD04 (42547-1)	6/17/99 11:30	RB 6/17 (42547-2)	PW0623B1	PW0623L1 PW0623L2	6/23/99	7/14/99
SD12 (42547-3)	6/17 13:18					7/15/99
SD-13 (42547-4)	6/17 15:30	↓				7/15/99
SD-03 (42551-1)	6/18 9:30	RB 6/18 (42551-3)				7/15/99
SD-03MS (42551-1MS)	6/18 10:00					7/15/99
SD-03MSD (42551-MSD)	6/18 10:30					7/15/99
SD-03 Deep (42551-2)	6/18 11:00					7/15/99
SD-06 (42551-5)	6/18 15:30					7/16/99
SD-07 Deep (-6)	6/18 16:30					7/16/99
SD-07 Shallow (-7)	6/18 16:30					7/16/99
SD-05 Deep (-8)	6/18 17:30					7/16/99
-05 Shallow (-9)	6/18 17:30	↓	↓	↓	↓	7/16/99
SD-2 (42574-1)	6/21/99	RB 6/21 (42562-3)	PW0625B1	PW0625L1 PW0625L2	6/25/99	7/17/99
SD-2 DUP (-2)	6/21					7/17/99
SD-01 (-3)	6/21					7/17/99
SD-10 (-4)	6/21					7/17/99
SD-11 (-5)	6/21	↓				7/17/99
SD-8 (42575-1)	6/22/99	RB 6/22 (42563-9)				7/17/99
SD-9 (-2)	6/22	↓	↓	↓	↓	7/17/99
RB 6/17 (42547-2)	6/17	N/A	PW0623B1	PW0623L1 PW0623L2	6/23/99	7/15/99
RB 6/18 (42551-3)	6/18		↓	↓	↓	↓
RB 6/21 (42562-3)	6/21		PW0625B1	PW0625L1 PW0625L2	6/25/99	7/17/99
RB 6/22 (42563-9)	6/22					
RB 6/23 (42563-14)	6/23	↓	↓	↓	↓	↓

2. GC/ECD Instrument Performance Check

The instrument performance check, called Performance Evaluation Mixture (PEM) is analyzed to ensure the accuracy and sensitivity of the results relative to instrument performance.

Review the PEMs for the Pesticides.

Was the degradation of 4,4'-DDT to 4,4'-DDE and 4,4'-DDD <15% and was the degradation of Endrin to Endrin aldehyde and Endrin ketone < 15%? Yes / **No**. Were all compounds in the PEM 90% resolved on each GC Column? Yes / **No** If no, list below the affected samples.

Was a PEM analyzed daily or every 12 hours o instrument use? **Yes** / **No**. If no, list below the affected samples.

Action: If resolution of the PEM compounds is not acceptable (on one or both columns) professional judgment must be used in qualifying data. For example, if resolution is poor on both columns for two analytes, and if a sample reports one or both of these analytes as detected, the positive results should be qualified as estimated (J) due to uncertainty in quantitation and possibly in qualitative identification. If the breakdown for DDT and/or Endrin exceeds 15%, qualify all positive results for these compounds as estimated (J). If these two compounds are not detected, but their breakdown products are detected, qualify the DDT and/or Endrin non-detect result as rejected (R) and qualify the breakdown products as estimated (J).

Comments:

5 PEMs evaluated - All OK No Action Required

5. Initial Calibration

The initial calibration data are reviewed to determine if the standards were compliant with the method protocols.

Review the Initial Calibration Data Summary for Pesticides and PCBs. Were linear (RRFs or CFs) statistics or calibration curves used in the initial calibration? **Linear / Curve?** If linear calibration, check and recalculate at least one pesticide compound and one peak for an Arochlor across the ICAL. Does the RRF and %RSD check back to the raw data? **Yes / No**. Did the initial calibration meet %RSD criteria of ≤ 30% for all analytes (surrogates and targets) across the calibration range? **Yes / No**. If no, was the average %RSD for all analytes in the calibration ≤ 30%? **Yes / No.** Were the RRFs for all analytes in the standard all greater than or equal to 0.05? **Yes / No**

If curve statistics were used for the initial calibration, was the regression coefficient > 0.99? **Yes / No.** Were the curves generated with sufficient points (linear with 5 points, quadratic with 6)? **Yes / No.** Was the curve forced through the origin? **Yes / No.** If yes, resubmittal of calibrations and samples must be requested to correct this non-compliance issue. – Reissued data (see page 3b) was not forced through origin.

Was the lowest initial calibration standard at a concentration equivalent to the sample-specific reporting limit? **Yes / No**

Were retention times for each target analyte stable across the calibration (i.e., minimum drift)? **Yes / No**

Action: If the %RSD >30% and average RRF ≥0.05, qualify positive and non-detected results as estimated (J and UJ). If the %RSD >30% and average RRF < 0.05 estimate positive results (J) and rejecy non-detected results (R). If the %RSD ≤ 30% and average RRF < 0.05 estimate positive results (J) and reject non-detected results (R). If the regression coefficient < 0.99, qualify positive and non-detected results as estimated (J and UJ). Sound technical judgment should be used in qualification of the data. The results for each sample associated with ICAL should be evaluated to determine if a result reported would be impacted by the mis-calibration. For curve analysis, if the percent Difference (%D) between the calculated area and the reported area > ±25%, qualify positive and non-detected results as estimated (J and UJ).

Comments:

Linear Pesticide ICAL Check: Compound Checked NA CURVE

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Avg. RRF	%RSD
Concentration								
Response Cpd								
Conc, IS								
Response IS								
RRF								

3. Initial Calibration – continued

Linear PCB ICAL Check: Compound/Peak Checked NA

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Avg. RRF	%RSD
Concentration								
Response Cpd								
Conc, IS								
Response IS								
RRF								

If curve statistics are used, verification of the computer generated equation may be difficult across the ICAL. Instead, a check is made for one pesticide and one PCB peak to determine whether the equation matches the data obtained as follows:

Curve equation: $y = a + bx + cx^2 + dx^3$

Where: $y = \frac{\text{Area compound}}{\text{Area Internal Standard}}$ or y = Area compound (external std. calibration)

$x = \frac{\text{Concentration Compound}}{\text{Concentration IS}}$ or x = Conc. compound (external std calibration)

Since solving for x is somewhat difficult, the system is checked by using the Calculated Compound Concentration to solve for the Area of the compound as follows:

Pesticide Compound evaluated: Dieldrin -Channel A

Standard evaluated: 8081 LS

ICAL calibration formula:

$$y = (0.001617) + (1.478044)x + (-0.120473)x^2$$

Amount Reported	Amount of IS	Calculated x	Calculated y	Area of IS	Calculated Area of compound	Reported Area of Compound
106.1367	50	2.1227	2.5962	78659	204219	163380
					%Difference	20.0%

3. Initial Calibration – continued

PCB Peak evaluated: Ar 1016 Peak #2

Standard evaluated: 1660L4 - Channel A - 7/14/99 @ 15:08

ICAL calibration formula:

$$y = (2839.324341) + (97.961567)x + (-0.006172)x^2 + 0x^3$$

Amount Reported	Amount of IS	Calculated x	Calculated y	Area of IS	Calculated Area of compound	Reported Area of Compound
317.7078	N/A	317.7078	33339	N/A	33339	31119
					%Difference	6.6%

Pesticide lowest ICAL = 2 µg/mL; however Response very low. Lab set RL based on next lowest std of ~~2~~ 4 µg/mL. RL = ~~2~~ 4 µg/mL × $\frac{2\,mL}{1000\,mL}$ = ~~0.004~~ 0.008 [illegible]

-Some stds were lower than 4 µg/mL; however, RL met QAPP Requirement.

-ICAL run on 8-level AR1660 - with single pt AR1221, 1232, 1242, 1248, 1254 + Toxaphene.

6. Continuing Calibration Check

The continuing calibration data are reviewed to determine if the standards were contractually compliant.

Review the Continuing Calibrations (CCAL) and Summaries. If average RRFs or CFs are used, check and recalculate the RRF and %Difference (%D) for at least one of the Pesticides and one of the PCBs in one of the CCALs. Does the RRF or CF and %D check back to the raw data? **Yes / No** Were the RRFs for all analytes in the standard all ≥ 0.05? **Yes / No** NA because averages not used.

If curve statistic calibrations were used, check one of the CCALs for one Pesticide and one peak for a PCB to determine if the calibration relates properly back to the corresponding ICAL. Do the CCALs properly reference the correct ICALs? **Yes / No.**

Was a continuing calibration check performed every 12 hours following tuning verification of the instrument? **Yes / No.** If no, list below all the affected samples.

Were the target analytes recovered within the expected retention time window based upon the initial calibration (i.e., drift of instrument was acceptable)? **Yes / No.**

Did the continuing calibrations meet 8081A and 8082 criteria for verification of %D ≤ ±15% or %Drift ≤ ±15% for every compound? **Yes / No** Did the continuing calibrations meet 8081A and 8082 criteria for verification where the average of all compounds analyzed had %D ≤ ±15% or %Drift ≤ ±15% for every compound? **Yes / No** If no, list below the outliers and the affected samples.

Yes on all except Pest CCV 7158081

Action: If the %D or %Drift for a compound > ±15%, estimate positive and non-detected results (J and UJ) for samples analyzed following this standard for the compound(s) that was outside of calibration.

Comments:

Linear CCAL Pesticide check: CURVE NA

CCAL Check: Standard ID _______________: Compound Checked _______________

Responses	RRF/CF	avg. RRF(CF) ICAL	% Difference
Cpd:			
IS:			

Linear CCAL PCB check: CURVE NA

CCAL Check: Standard ID _______________: PCB/peak Checked _______________

Responses	RRF/CF	avg. RRF(CF) ICAL	% Difference
Cpd:			
IS:			

4. Continuing Calibration Check - continued

If curve statistics are used, verification of the computer generated equation may be difficult across the ICAL. Instead, a check is made for one pesticide and one PCB peak to determine that the correct equations were used to generate the amount found in the CCAL standard

Curve equation: $y = a + bx + cx^2 + dx^3$

Where: $y = \dfrac{\text{Area compound}}{\text{Area Internal Standard}}$ or y = Area compound (external std. calibration)

$x = \dfrac{\text{Concentration Compound}}{\text{Concentration IS}}$ or x = Conc. compound (external std calibration)

Since solving for x is somewhat difficult, the system is checked by using the Calculated Compound Concentration to solve for the Area of the compound as follows:

Pesticide Compound evaluated: 4,4'-DDD

Standard evaluated: 8081 CCV 7/14/99 @ 17:37 Channel A

ICAL calibration formula:

$$y = (-0.001569) + (0.960366)x + (-0.067554)x^2 + 0x^3$$

Amount Reported	Amount of IS	Calculated x	Calculated y	Area of IS	Calculated Area of compound	Reported Area of Compound
39.3792	50	0.7876	0.7129	82231	58622	58622
					%Difference	0

Amount Found	Theoretical Amount	% Drift
39.38	40	+1.56% ✓

Lab reported -2% - equation for Drift Backward

Endrin Ketone Channel A 7/15/99 @ 04:12 8081CCV at 22% - Channel B OK No Action

* CCV out — 7158081I 7/15/99 @ 16:01 8081CCV - 14 Channel B compounds + the Average %D for All >15% ; 6 Channel A Compounds out - Lab originally performed calibration improperly (resubmittal requested) and this standard was OK ; however, re-quantification using correct calibration protocols indicate that this CCV was non-compliant. See next page

4. Continuing Calibration Check - continued

PCB and Peak evaluated: AR1260 Peak #2

Standard evaluated: A9711601 7/14/94 @ 18:39 Channel B

ICAL calibration formula:

$$y = (-2762.916314) + (177.065184)x + (-0.012052)x^2 + 0x^3$$

Amount Reported	Amount of IS	Calculated x	Calculated y	Area of IS	Calculated Area of compound	Reported Area of Compound
905.0029	N/A	905.0029	147611	N/A	147611	147611
					%Difference	0

Amount Found	Theoretical Amount	% Drift
901.36	1000	+9.9% ✓

Lab reported -10% - Equation for drift backward.

- Lab % Drift (or %D) formula gives $\frac{\text{Found} - \text{True}}{\text{True}}$ (i.e., sign of %D is incorrect ⇒ a - %D ⇒ loss of sensitivity w/ + %D ⇒ increased sensitivity - this is opposite standard convention for %D ($\frac{\text{True} - \text{Found}}{\text{True}}$)
- Samples run immediately after CCV 7158081I were SD-03, SD-03MS, SD-03MSD, SD-03 Deep, RB 6/18, SD-06, SD-07 Deep, SD-07 Shallow, SD-05 Deep and SD-05 Shallow. Channel A, TMX -18%; α-BHC -16%, γ-BHC -16%, Endrin Aldehyde 17%; Methoxychlor -16% + Endrin Ketone 17%. - All others on channel A + Average %D OK. Analytes listed above on Channel B were also > ± 15%D.

* Action: Results for α-BHC, γ-BHC, Endrin Aldehyde, Methoxychlor + Endrin Ketone qualified as estimated (UJ) in SD-03, SD-03 Deep, SD-06, SD-07 Deep, RB 6/18, SD-07 Shallow, SD-05 Deep + SD-05 Shallow due to non-compliant calibration verification.

Continued on next page

Additional Notes:

using lab's convention for %D calculation

Pest. CCV 71680811

4,4'-DDT Channel A=∓24%D ; Channel B:∓22%D

Endrin Aldehyde Channel A=∓16%D ; Channel B= ∓22%D

Methoxychlor Channel A=∓26% Channel B=-27%D

Endrin Ketone Channel A= ∓19% Channel B: ∓20%D

This CCV is associated with Sample: RB 6/21, RB 6/22, RB 6/23, SD-2, SD-2 DUP, SD-01, SD-10.

* Action results for 4,4'-DDT, Endrin Aldehyde, Methoxychlor + Endrin Ketone qualified as estimated (UJ) in Sample listed above.

CCV Pest 71680812

4,4'-DDT Channel A=-28% ; Channel B=-19%

Methoxychlor Channel A=-29% ; Channel B=-29%

Endrin Ketone Channel A=-21% ; Channel B=-23%

This CCV is associated with sample: SD-11, SD-8 + SD-9

* Action results for 4,4'-DDT, Methoxychlor + Endrin Ketone qualified as estimated (UJ) due to non-compliant CCV in SD-11, SD-8 + SD-9.

CCV Pest 71680813 - ending calibration standard

4,4'-DDT channel A = -32% ; Channel B = -22%

Methoxychlor Channel A = -35% ; Channel B = -34%

Endrin Ketone Channel A = -25% ; channel B = -27%

- No Action taken since sample immediately preceding were qualified based on CCV 71680812

7 PCB CCVs all within ±15%D for AR1016, AR1260, TMX + DCB Surrogates - No action required.

It should be noted that original Pesticide CCV'S submitted with improper curve calibration on ICAL were within better control. After reprocessing of data, %D's exceeded ±15%.

5. Laboratory and Field Blank Results

Laboratory and field blank results are reviewed to assess the presence of contaminants, which affect the accuracy and sensitivity of the results. See Table 1a. where the Holding Time and Associated QC Table was completed for the samples within this SDG.

Was each sample analysis associated with the appropriate method blank, *ie.*, correct matrix, correct matrix level, same extraction batch? **Yes** / **No.** If no, list below affected samples. Were Cleanup Blanks analyzed? **Yes / No / NA.**

Review the reporting forms for each method and field blank. Were any target compounds in the method blanks detected at concentrations above the Reporting Limit (RL)? **Yes / No.**

Action: - Blanks should not contain contaminants above the. The Blank Action Level is defined as five times the highest level seen in any of the matrix-matched blanks associated with this SDG. The following actions should be taken if conditions warrant :

9. If the blank is not matrix matched, qualify all sample data, for the contaminant associated with this blank, with BB or EB, as appropriate.
10. If the reported result in a sample is below the reporting limit (sample < RL) and if a matrix-matched blank contains a result above the quantitation limit (blank > RL), the result in the sample should be negated (U) and raised to the sample-specific RL for that sample
11. If the sample result is between the reporting limit and the blank Action Level (RL < sample < Action Level), the result for the sample is negated (U) at the level found in the sample. Based on the level of contamination suspected in the sample, the reporting limit may be elevated. Professional judgment will be used in assessing the action needed.
12. If the sample result is greater than the RL and the blank Action Level, no action is taken.

Comments: No Field blanks were collected with the surface water samples.

Blanks evaluated: ~~RB 6/17, RB 6/15, RB 6/21, RB 6/22, PW0623SB1 + PW0625B1~~

Highest Blank: (Rinsate blanks are for Sediments only.)

Action taken: No Blank Action Required.

[initials] 12/9/99

Sample ID	Compound	Reported Result		Result based on Blank Action

6. Surrogate Spike Recoveries

The surrogate spike recoveries are reviewed to assess the accuracy of the results relative to laboratory performance and specific sample matrix.

Review the Surrogate Recovery information for each field and quality control sample. For one sample, verify that the recoveries reported correspond to the raw data and that the recovery calculation was done properly. Were the recovery data reported properly? Yes / No.

Were the surrogate recoveries within QAPP defined and method-generated accuracy limits? Yes / No. If no, were the affected samples reanalyzed? **Yes / No.** Did the chromatography of the affected samples show interferences? **Yes / No.** Was the retention time (RT) of the surrogates within criteria (Tetrachloro-m-xylene within ± 0.05 min and Decachlorobiphenyl ± 0.10 min from average RT of surrogate from ICAL)? Yes / No. List below the affected samples.

Action – Professional judgment must be used in qualifying data for Pesticides/PCBs based upon the surrogate recoveries. If recovery is outside of criteria on one column, but acceptable on the other, and all quantitative results are obtained for the samples on the second column, then qualification of the data may not be required. If quantitation is reported for a particular column, and surrogate recoveries are outside of criteria, the following actions may be taken: if 10% < %Rec < Lower Acceptance Limit, qualify detected and non-detected results as estimated (J and UJ); if %Rec > Upper Acceptance Limit estimate detected results (J), no action required for non-detects; if %Rec < 10%, estimate (J) positive results and reject (R) non-detects. A review of the data for both columns, comparing sample chromatograms to standard chromatograms, must be done and professional judgment must be used to determine if action is warranted. List below the affected samples and required actions.

Comments:

Sample SD-07 Deep TMX % Rec on Channel A + B different by 56% RPD - Both Recoveries still within QAPP criteria.

All Surrogates within criteria - no action Required.

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

The matrix spike/matrix spike duplicate (MS/MSD) recoveries are reviewed to assess the accuracy of the results relative to the specific sample matrix and the relative percent differences (RPDs) are reviewed to assess the precision of the results relative to the specific sample matrix.

Review the unspiked sample, Matrix Spike, and Matrix Spike Duplicate (MS/MSD) raw data and recovery results. Were the recoveries for the MS/MSD calculated properly? **Yes / No.**

Did the laboratory perform MS/MSDs for each matrix and matrix level analyzed for each analytical batch prepared for analysis? **Yes / No.** If no, list below the affected samples. - MS/MSD as requested by project - 1 MS/MSD / 17 Samples.

Were the MS/MSD recoveries and precision within QAPP and method-generated accuracy limits? **Yes / No.** Were the RPDs between the MS/MSD within the QAPP precision criteria? **Yes / No.** If no, list below the affected compounds.

Was the %RSD for non-spiked compounds in the unspiked sample, MS and MSD ≤ 50%? **Yes / No / NA**

Action: No action is taken to the entire data set based on MS/MSD results alone. The unspiked sample may be qualified based on MS/MSD results as follows: if the MS/MSD recoveries were greater than the upper accuracy limit, estimate (J) positive results due to potential high bias; no action is required for non-detect results; if the MS/MSD recoveries were below the lower accuracy limit but above 10%, estimate (J and UJ) positive and non-detect results due to potential low bias; if a MS/MSD compound was recovered below 10% or not at all, estimate (J) positive results due to potential low bias and evaluate the non-detected results to determine whether estimation (UJ) or rejection (R) of the unspiked sample data is warranted. If the RPD between the MS and MSD > QAPP criteria, estimate (J and UJ) positive and non-detected results in the unspiked sample. If the %RSD, for a non-spiked compound, between the unspiked sample, MS, and MSD >50%, estimate (J) positive results and use professional judgement to qualify other detected and non-detected analytes.

Comments: Extraction information indicates that MS/MSD done on Pesticides - no PCB (would have caused interference with analysis). Lab's MS/MSD % Rec criteria - tighter than QAPP for all analytes but γ-BHC + Aldrin (slightly lower acceptance). RPD though for lab set at 50% limit - did not use QAPP RPD criteria - lab contacted on 10/13/99 and validator informed that 50% RPD was historically chosen - not statistically derived. Therefore, evaluation made of RPD vs. QAPP criteria (not lab) - MS/MSD RPDs OK except for Heptachlor 38% (≤22% criteria) + γ-BHC 24% (≤15% criteria)

* Action: Results of Heptachlor and γ-BHC qualified as estimated (UJ) in SD-03 (unspiked sample) due to precision objectives not being met.

8. Laboratory Control Sample and Standard Reference Material Analysis

The Laboratory Control Samples (LCS) and/or Standard Reference Material (SRM) are reviewed to assess the accuracy of the results relative to the analytical procedure.

Review the raw data and recovery information for the LCS/SRM.

Did the laboratory perform a LCS or SRM for each matrix and matrix level analyzed? Yes / No. If no, list below the affected samples.

Were the LCS or SRM recoveries within QAPP and method-generated accuracy requirements for recovery? Yes / No. If no, list below the affected compounds.

Action: . If the LCS or SRM recoveries are above criteria, estimate (J) positive results due to potential high bias, no qualification of non-detected results is necessary. If the LCS or SRM recoveries are between 10% to the lower recovery limit, estimate (J and UJ) positive and non-detect results for the samples associated with the analytical batch due to potential low bias in the results. If the recovery in the LCS or SRM is less than 10%, estimate (J) positive results due to low bias and reject (R) non-detect results due to potential false negatives.

Comments:

Lab generated QC limits given for 8081A + 8082 LCS % Rec.
PW0623L1 + PW0625L1 for Pest all OK (% Rec also within QAPP criteria)
PW0623L1 + PW0625L1 for PCBs OK - Used AR1660 spike instead of AR1254 - more representative of range of PCBs => Acceptable.

No action required.

9. Pesticide Cleanup Checks

Where cleanup protocols used on the Pesticide/PCB extracts? **Yes / No.** If yes, what cleanups were used and what QC was generated to verify the adequacy of the cleanup:

Cleanup Protocol	QC Activities

Were all samples and QC from the original extraction put through the cleanup protocols? **Yes/ No.** NA
Were there any QC results which indicated that the cleanup was not adequate? **Yes / No.**

Action: If a QC sample, for example Method Blank or LCS, demonstrates unacceptable results (e.g., contamination or loss of analytes of interest), the data associated with these QC samples may require qualification based on professional judgment.

Comments:

No cleanup done for surface waters - No action required.

10. Sample Quantitation Limits

Review raw data and reporting forms. Did the sample-specific RLs meet the QAPP criteria? **Yes/No.** Did the laboratory accurately adjust sample reporting limits to account for sample specific preparation and analysis conditions? **Yes / No.**

Were all components reported in the samples quantitated within the calibration region of the instrument for the detected analytes? **Yes/No** Were the relative retention times for all components reported within the retention time windows established during initial calibration? **Yes/No** NA

If the sample analyses were performed at dilutions, were more concentrated analyses performed or was sample screening information included in the data package? **Yes / No** NA

Were sample dilutions appropriate relative to scaling of the chromatograms and the calibration levels employed (e.g, peaks of interest within upper half of the chromatogram and quantitation done within the calibration range)? **Yes / No.** NA

Action - If the quantitation limits for non-detect results are lower than the lowest calibration standard, or if a positive result is detected outside of the calibration range, estimate positive and non-detected results (J and UJ).

Comments:

No dilutions performed. No action Required.

Methoxychlor QAPP RL was 0.05 ug/L. SD-04 RL = 0.051 ug/L; SD-8 0.053 ug/L + SD-9 - 0.051 ug/L - This increase in RL was due to limited sample volume for extraction.

11. Field Duplicate Precision

Field duplicate samples are reviewed to assess representativeness of the sample aliquot to the area sampled and the precision of the results relative to field sampling techniques.

Review analytical results for the duplicate sample analyses.

Action: If field duplicate precision exceeded 30% RPD for aqueous samples or 50% RPD for sediment or biota samples for any compound, estimate (J and UJ) positive and non-detect results for the affected compounds in both samples. If severe imprecision was noted in the field duplicate sample (i.e., RPD >100%), qualify the remainder of the associated field sample data based on sound technical judgment.

Comments:

Field Duplicate Samples: SD-2 SD-2 DuP

- Results for Pesticides + PCBs in both samples were non-detect; therefore precision was not able to be assessed.

12. Additional QA/QC Issues

Were the percent solids for the samples >30%. **Yes / No** NA

List any additional issues which may affect the quality of the results. List the affected samples, QA/QC issue, and necessary actions taken in the comments section below.

Action: If the %solids were between 10% and 30%, qualify positive results as estimated (J) and reject non-detected results (R). If the %solids were < 10%, reject (R) positive and non-detected results.

No additional QA/QC issues noted other than Sample Date on Database Excel file incorrect for several samples. The Sample date was corrected during this assessment.

IVC. Example Sample Calculations

Review of one sample per data package is performed to determine if sample results and quantitation limits were correctly calculated and reported.

Sample ID: 5D-05 Shallow was selected for review in this data package.

A. Form 1 Review

1. Were the Form Is for completed according to the method/QAPP requirements? **Yes / No.** If no, list below the affected fields.

2. Reproduce the reporting limit for Pesticides/PCBs in one of the samples, did the laboratory correctly calculate the quantitation limits? **Yes / No.** If no, list below.

910 mL extracted to 2 mL ; lowest Pest used was at 4 µg/mL (std)

D. Quantitation Review $\therefore$ RL: $4 \times \frac{2}{910}$ = 0.009 µg/L - Lab used 0.0088 ✓

Reproduce a calculation for one pesticide/PCB analyte in one of the samples that contained a positive result and compare the calculated result to the result reported by the laboratory.

Analyte Checked: ______________________

Laboratory Result: ______________ Calculated Result: ______________

Example Calculation:

No detected Pesticide or PCB reported for SDG ⇒

Calculation check not possible other than to check

RL ✓

Surface Water Results Draft DV

Client Sample ID:	SD04) SD-04			SD12) SD-12			SD-13			SD-03			SD-03DEEP		
Lab Sample ID:	42547-1			42547-3			42547-4			42551-1			42551-2		
Sample Date:	06/17/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual
Analyte															
VOCs-8260 B															
Chloromethane	2	U	UJ	2	U	UJ	2	U	UJ	2	U	U	2	U	U
Vinyl chloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromomethane	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
Chloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Acetone	5	U	U	5	U	U	5	U	U	5	U	U	5	U	U
1,1-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Carbon disulfide	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Methylene chloride	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ
trans-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
2-Butanone (MEK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
cis-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Chloroform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,1-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Carbon tetrachloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Benzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Trichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,2-Dichloropropane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromodichloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Methyl isobutyl ketone (MIBK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
cis-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Toluene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
trans-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,2-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
2-Hexanone	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Tetrachloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Dibromochloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,2-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Chlorobenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Ethylbenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
p/m-Xylene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
o-Xylene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Styrene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromoform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,2,2-Tetrachloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U

NEH, Inc.

Client Sample ID:	TRIP BLANK			SD-06			SD-07DEEP			SD-07SHALLOW			SD-05DEEP		
Lab Sample ID:	42551-4			42551-5			42551-6			42551-7			42551-8		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual
nalyte															
OCs-8260 B															
hloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
inyl chloride	2	U	U	2	U	U	1	J	J	2	U	U	3		
romomethane	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
hloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
cetone	5	J	J	5	J	U	5	J	U	5	U	U	5	U	U
,1-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
arbon disulfide	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
ethylene chloride	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ
ans-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
,1-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
-Butanone (MEK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
is-1,2-Dichloroethene	2	U	U	2			6			2			13		
Chloroform	1	J	J	2	U	U	2	U	U	2	U	U	2	U	U
1,1,1-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Carbon tetrachloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Benzene	2	U	U	2	U	U	63			2	U	U	190		
Trichloroethene	2	U	U	2	J	J	2	J	J	2	J	J	4		
1,2-Dichloropropane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromodichloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Methyl isobutyl ketone (MIBK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
cis-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Toluene	2	U	U	4			2	U	U	2	U	U	2	U	U
trans-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,2-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
2-Hexanone	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Tetrachloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Dibromochloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,2-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Chlorobenzene	2	U	U	2	U	U	1	J	J	2	U	U	4		
Ethylbenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
p/m-Xylene	4	U	U	4	U	U	4	U	U	4	U	U	2	J	J
o-Xylene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Styrene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromoform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,2,2-Tetrachloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U

Client Sample ID:	SD-05SHALLOW			SD-2 SD-02			2DUP SD-02DUP			SD-01			SD-10		
Lab Sample ID:	42551-9			42574-1			42574-2			42574-3			42574-4		
Sample Date:	06/18/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV
Units	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual
Analyte							Field Duplicate								
VOCs-8260B															
Chloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Vinyl chloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromomethane	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
Chloroethane	2	U	U	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
Acetone	5	J	U	5	U	U	5	JB	U	5	U	U	5	U	U
1,1-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Carbon disulfide	2	U	U	2	U	UJ	2	U	UJ	2	U	UJ	2	U	UJ
Methylene chloride	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ
trans-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
2-Butanone (MEK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
cis-1,2-Dichloroethene	2			2	U	U	2	U	U	2	U	U	2	U	U
Chloroform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,1-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Carbon tetrachloride	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Benzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Trichloroethene	2	J	J	2	U	U	2	U	U	2	U	U	2	U	U
1,2-Dichloropropane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromodichloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Methyl isobutyl ketone (MIBK)	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
cis-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Toluene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
trans-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,2-Trichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
2-Hexanone	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Tetrachloroethene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Dibromochloromethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,2-Dichloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Chlorobenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Ethylbenzene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
p/m-Xylene	4	U	U	4	U	U	4	U	U	4	U	U	4	U	U
o-Xylene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Styrene	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
Bromoform	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U
1,1,2,2-Tetrachloroethane	2	U	U	2	U	U	2	U	U	2	U	U	2	U	U

Client Sample ID:	SD-11			SD-8 SD-08			SD-9 SD-09		
Lab Sample ID:	42574-5			42575-1			42575-2		
Sample Date:	06/21/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units	UG/L	Qual.	Qual	UG/L	Qual.	Qual	UG/L	Qual.	Qual
nalyte									
OCs-8260 B									
hloromethane	2	U	U	2	U	U	2	U	U
inyl chloride	2	U	U	2	U	U	2	U	U
romomethane	2	U	UJ	2	U	UJ	2	U	UJ
hloroethane	2	U	UJ	2	U	UJ	2	U	UJ
cetone	5	U	U	5	U	U	5	JB	U
,1-Dichloroethene	2	U	U	2	U	U	2	U	U
arbon disulfide	2	U	UJ	2	U	UJ	2	U	UJ
lethylene chloride	5	U	UJ	5	U	UJ	5	U	UJ
rans-1,2-Dichloroethene	2	U	U	2	U	U	2	U	U
,1-Dichloroethane	2	U	U	2	U	U	2	U	U
-Butanone (MEK)	2	U	U	2	U	U	2	U	U
is-1,2-Dichloroethene	2	U	U	2			1	J	J
Chloroform	2	U	U	2	U	U	2	U	U
1,1,1-Trichloroethane	2	U	U	2	U	U	2	U	U
Carbon tetrachloride	2	U	U	2	U	U	2	U	U
Benzene	2	U	U	2	U	U	2	U	U
Trichloroethene	2	U	U	2	J	J	2	U	U
1,2-Dichloropropane	2	U	U	2	U	U	2	U	U
Bromodichloromethane	2	U	U	2	U	U	2	U	U
Methyl isobutyl ketone (MIBK)	2	U	U	2	U	U	2	U	U
cis-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U
Toluene	2	U	U	2	U	U	2	U	U
trans-1,3-Dichloropropene	2	U	U	2	U	U	2	U	U
1,1,2-Trichloroethane	2	U	U	2	U	U	2	U	U
2-Hexanone	2	U	U	2	U	U	2	U	U
Tetrachloroethene	2	U	U	2	U	U	2	U	U
Dibromochloromethane	2	U	U	2	U	U	2	U	U
1,2-Dichloroethane	2	U	U	2	U	U	2	U	U
Chlorobenzene	2	U	U	2	U	U	2	U	U
Ethylbenzene	2	U	U	2	U	U	2	U	U
p/m-Xylene	4	U	U	4	U	U	4	U	U
o-Xylene	2	U	U	2	U	U	2	U	U
Styrene	2	U	U	2	U	U	2	U	U
Bromoform	2	U	U	2	U	U	2	U	U
1,1,2,2-Tetrachloroethane	2	U	U	2	U	U	2	U	U

Industri-Plex, Woburn, MA
Surface Water Results

Draft DV

Client Sample ID:	SD04 SD-04			RINSE BLANK			SD-12			SD-13			SD-03		
Lab Sample ID:	42547-1			42547-2			42547-3			42547-4			42551-1		
Sample Date:	06/17/1999	Lab	DV	06/17/1999	Lab	DV	06/17/1999	Lab	DV	06/17/1999	Lab	DV	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte															
SemiVOCs-8270															
bis(2-Chloroethyl)ether	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Phenol	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2-Chlorophenol	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
1,3-Dichlorobenzene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
1,4-Dichlorobenzene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
1,2-Dichlorobenzene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
bis(2-chloroisopropyl)ether	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Hexachloroethane	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
N-Nitroso-di-n-propylamine	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Nitrobenzene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Isophorone	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2-Nitrophenol	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2,4-Dimethylphenol	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
bis(2-Chloroethoxy)methane	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2,4-Dichlorophenol	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
1,2,4-Trichlorobenzene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Naphthalene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Hexachlorobutadiene	4	U	UJ	4	U	UJ	4	U	UJ	5	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Hexachlorocyclopentadiene	10	U	UJ	11	U	UJ	10	U	UJ	12	U	UJ	11	U	UJ
2,4,6-Trichlorophenol	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2-Chloronaphthalene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Acenaphthylene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Dimethylphthalate	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2,6-Dinitrotoluene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Acenaphthene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2,4-Dinitrophenol	10	U	UJ	11	U	UJ	10	U	UJ	12	U	UJ	11	U	UJ
2,4-Dinitrotoluene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
4-Nitrophenol	10	U	U	11	U	U	10	U	U	12	U	U	11	U	U
Fluorene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
4-Chlorophenyl-phenylether	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Diethylphthalate	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
4,6-Dinitro-2-methylphenol	10	U	UJ	11	U	UJ	10	U	UJ	12	U	UJ	11	U	UJ
n-Nitrosodiphenylamine	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
4-Bromophenyl-phenylether	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U

10/13/99

Client Sample ID	SD04 SD-04			RINSE BLANK			SD12 SD-12			SD-13			SD-03		
Lab Sample ID:	42547-1			42547-2			42547-3			42547-4			42551-1		
Sample Date:	06/17/1999	Lab	DV	06/17/1999	Lab	DV	06/17/1999	Lab	DV	06/17/1999	Lab	DV	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte															
SemiVOCs-8270															
Hexachlorobenzene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Pentachlorophenol	10	U	U	11	U	U	10	U	U	12	U	U	11	U	U
Phenanthrene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Anthracene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Di-n-butylphthalate	4	U	U	6			4	U	U	5	U	U	4	U	U
Fluoranthene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Pyrene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Butylbenzylphthalate	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
3,3'-Dichlorobenzidine	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Benzo[a]anthracene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Chrysene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Di-n-octylphthalate	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Benzo[b]fluoranthene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Benzo[k]fluoranthene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Benzo[a]pyrene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Indeno[1,2,3-cd]pyrene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Dibenz[a,h]anthracene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Benzo[g,h,i]perylene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2-Methylphenol	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
4-Methylphenol	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
4-Chloroaniline	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2-Methylnaphthalene	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
2,4,5-Trichlorophenol	10	U	U	11	U	U	10	U	U	12	U	U	11	U	U
2-Nitroaniline	10	U	U	11	U	U	10	U	U	12	U	U	11	U	U
3-Nitroaniline	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
Dibenzofuran	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U
4-Nitroaniline	10	U	U	11	U	U	10	U	U	12	U	U	11	U	U
Carbazole	4	U	U	4	U	U	4	U	U	5	U	U	4	U	U

Client Sample ID:	SD-03DEEP			RINSE BLANK			-08			SD-07DEEP			SD-07SHALLOW		
Lab Sample ID:	42551-2			42551-3			42551-5			42551-6			42551-7		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte															
SemiVOCs-8270															
bis(2-Chloroethyl)ether	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Phenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2-Chlorophenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
1,3-Dichlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
1,4-Dichlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
1,2-Dichlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
bis(2-chloroisopropyl)ether	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Hexachloroethane	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
N-Nitroso-di-n-propylamine	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Nitrobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Isophorone	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2-Nitrophenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,4-Dimethylphenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
bis(2-Chloroethoxy)methane	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,4-Dichlorophenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
1,2,4-Trichlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Naphthalene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Hexachlorobutadiene	4	U	UJ	4	U	UJ	5	U	UJ	4	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Hexachlorocyclopentadiene	11	U	UJ	11	U	UJ	11	U	UJ	11	U	UJ	11	U	UJ
2,4,6-Trichlorophenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2-Chloronaphthalene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Acenaphthylene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Dimethylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,6-Dinitrotoluene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Acenaphthene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,4-Dinitrophenol	11	U	UJ	11	U	UJ	11	U	UJ	11	U	UJ	11	U	UJ
2,4-Dinitrotoluene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Nitrophenol	11	U	U	11	U	U	11	U	U	11	U	U	11	U	U
Fluorene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Chlorophenyl-phenylether	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Diethylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4,6-Dinitro-2-methylphenol	11	U	UJ	11	U	UJ	11	U	UJ	11	U	UJ	11	U	UJ
n-Nitrosodiphenylamine	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Bromophenyl-phenylether	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U

Client Sample ID:	SD-03DEEP			RINSE BLANK			SD-06			SD-07DEEP			SD-07SHALLOW		
Lab Sample ID:	42551-2			42551-3			42551-5			42551-6			42551-7		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte															
SemiVOCs-8270															
Hexachlorobenzene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Pentachlorophenol	11	U	U	11	U	U	11	U	U	11	U	U	11	U	U
Phenanthrene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Anthracene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Di-n-butylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Fluoranthene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Pyrene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Butylbenzylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
3,3'-Dichlorobenzidine	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[a]anthracene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Chrysene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	3	J	J	4	U	U	5	U	U	4	U	U	4	U	U
Di-n-octylphthalate	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[b]fluoranthene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[k]fluoranthene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[a]pyrene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Indeno[1,2,3-cd]pyrene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Dibenz[a,h]anthracene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Benzo[g,h,i]perylene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2-Methylphenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Methylphenol	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Chloroaniline	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2-Methylnaphthalene	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
2,4,5-Trichlorophenol	11	U	U	11	U	U	11	U	U	11	U	U	11	U	U
2-Nitroaniline	11	U	U	11	U	U	11	U	U	11	U	U	11	U	U
3-Nitroaniline	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
Dibenzofuran	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U
4-Nitroaniline	11	U	U	11	U	U	11	U	U	11	U	U	11	U	U
Carbazole	4	U	U	4	U	U	5	U	U	4	U	U	4	U	U

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Client Sample ID:	SD-05DEEP			SD-05SHALLOW			RINSE BLANK			RINSE BLANK A		
Lab Sample ID:	42551-8			42551-9			42562-3			42563-9		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte												
SemiVOCs-8270												
bis(2-Chloroethyl)ether	4	U	U	4	U	U	4	U	U	4	U	U
Phenol	5			4	U	U	4	U	U	4	U	U
2-Chlorophenol	4	U	U	4	U	U	4	U	U	4	U	U
1,3-Dichlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U
1,4-Dichlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U
1,2-Dichlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U
bis(2-chloroisopropyl)ether	4	U	U	4	U	U	4	U	U	4	U	U
Hexachloroethane	4	U	U	4	U	U	4	U	U	4	U	U
N-Nitroso-di-n-propylamine	4	U	U	4	U	U	4	U	U	4	U	U
Nitrobenzene	4	U	U	4	U	U	4	U	U	4	U	U
Isophorone	4	U	U	4	U	U	4	U	U	4	U	U
2-Nitrophenol	4	U	U	4	U	U	4	U	U	4	U	U
2,4-Dimethylphenol	4	U	U	4	U	U	4	U	U	4	U	U
bis(2-Chloroethoxy)methane	4	U	U	4	U	U	4	U	U	4	U	U
2,4-Dichlorophenol	4	U	U	4	U	U	4	U	U	4	U	U
1,2,4-Trichlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U
Naphthalene	4	U	U	4	U	U	4	U	U	4	U	U
Hexachlorobutadiene	4	U	UJ	4	U	UJ	4	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	4	U	U	4	U	U	4	U	U	4	U	U
Hexachlorocyclopentadiene	11	U	UJ	10	U	UJ	10	U	U	10	U	U
2,4,6-Trichlorophenol	4	U	U	4	U	U	4	U	U	4	U	U
2-Chloronaphthalene	4	U	U	4	U	U	4	U	U	4	U	U
Acenaphthylene	4	U	U	4	U	U	4	U	U	4	U	U
Dimethylphthalate	4	U	U	4	U	U	4	U	U	4	U	U
2,6-Dinitrotoluene	4	U	U	4	U	U	4	U	U	4	U	U
Acenaphthene	4	U	U	4	U	U	4	U	U	4	U	U
2,4-Dinitrophenol	11	U	UJ	10	U	UJ	10	U	UJ	10	U	UJ
2,4-Dinitrotoluene	4	U	U	4	U	U	4	U	U	4	U	U
4-Nitrophenol	11	U	U	10	U	U	10	U	U	10	U	U
Fluorene	4	U	U	4	U	U	4	U	U	4	U	U
4-Chlorophenyl-phenylether	4	U	U	4	U	U	4	U	U	4	U	U
Diethylphthalate	4	U	U	4	U	U	4	U	U	4	U	U
4,6-Dinitro-2-methylphenol	11	U	UJ	10	U	UJ	10	U	UJ	10	U	UJ
n-Nitrosodiphenylamine	4	U	U	4	U	U	4	U	U	4	U	U
4-Bromophenyl-phenylether	4	U	U	4	U	U	4	U	U	4	U	U

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Client Sample ID:	SD-05DEEP			SD-05SHALLOW			RINSE BLANK			RINSE BLANK A		
Lab Sample ID:	42551-8			42551-9			42562-3			42563-9		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte												
SemiVOCs-8270												
Hexachlorobenzene	4	U	U	4	U	U	4	U	U	4	U	U
Pentachlorophenol	11	U	U	10	U	U	10	U	U	10	U	U
Phenanthrene	4	U	U	4	U	U	4	U	U	4	U	U
Anthracene	4	U	U	4	U	U	4	U	U	4	U	U
Di-n-butylphthalate	4	U	U	4	U	U	4	U	U	24		
Fluoranthene	4	U	U	4	U	U	4	U	U	4	U	U
Pyrene	4	U	U	4	U	U	4	U	U	4	U	U
Butylbenzylphthalate	4	U	U	4	U	U	4	U	U	4	U	U
3,3'-Dichlorobenzidine	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[a]anthracene	4	U	U	4	U	U	4	U	U	4	U	U
Chrysene	4	U	U	4	U	U	4	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	4	U	U	4	U	U	4	U	U	4	U	U
Di-n-octylphthalate	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[b]fluoranthene	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[k]fluoranthene	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[a]pyrene	4	U	U	4	U	U	4	U	U	4	U	U
Indeno[1,2,3-cd]pyrene	4	U	U	4	U	U	4	U	U	4	U	U
Dibenz[a,h]anthracene	4	U	U	4	U	U	4	U	U	4	U	U
Benzo[g,h,i]perylene	4	U	U	4	U	U	4	U	U	4	U	U
2-Methylphenol	4	U	U	4	U	U	4	U	U	4	U	U
4-Methylphenol	4	U	U	4	U	U	4	U	U	4	U	U
4-Chloroaniline	4	U	U	4	U	U	4	U	U	4	U	U
2-Methylnaphthalene	4	U	U	4	U	U	4	U	U	4	U	U
2,4,5-Trichlorophenol	11	U	U	10	U	U	10	U	U	10	U	U
2-Nitroaniline	11	U	U	10	U	U	10	U	U	10	U	U
3-Nitroaniline	4	U	U	4	U	U	4	U	U	4	U	U
Dibenzofuran	4	U	U	4	U	U	4	U	U	4	U	U
4-Nitroaniline	11	U	U	10	U	U	10	U	U	10	U	U
Carbazole	4	U	U	4	U	U	4	U	U	4	U	U

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Client Sample ID:	RINSE BLANK B			(SD-2) SD-02			J-2DUP) SD-02 DUP			SD-01			SD-10		
Lab Sample ID:	42563-14			42574-1			42574-2			42574-3			42574-4		
Sample Date:	06/23/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte							FIELD DUP								
SemiVOCs-8270															
bis(2-Chloroethyl)ether	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Phenol	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2-Chlorophenol	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
1,3-Dichlorobenzene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
1,4-Dichlorobenzene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
1,2-Dichlorobenzene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
bis(2-chloroisopropyl)ether	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Hexachloroethane	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
N-Nitroso-di-n-propylamine	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Nitrobenzene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Isophorone	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2-Nitrophenol	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2,4-Dimethylphenol	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
bis(2-Chloroethoxy)methane	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2,4-Dichlorophenol	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
1,2,4-Trichlorobenzene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Naphthalene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Hexachlorobutadiene	4	U	UJ	5	U	UJ	5	U	UJ	5	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Hexachlorocyclopentadiene	11	U	U	13	U	U	13	U	U	13	U	U	10	U	U
2,4,6-Trichlorophenol	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2-Chloronaphthalene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Acenaphthylene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Dimethylphthalate	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2,6-Dinitrotoluene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Acenaphthene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2,4-Dinitrophenol	11	U	UJ	13	U	UJ	13	U	UJ	13	U	UJ	10	U	UJ
2,4-Dinitrotoluene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
4-Nitrophenol	11	U	U	13	U	U	13	U	U	13	U	U	10	U	U
Fluorene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
4-Chlorophenyl-phenylether	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Diethylphthalate	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
4,6-Dinitro-2-methylphenol	11	U	UJ	13	U	UJ	13	U	UJ	13	U	UJ	10	U	UJ
n-Nitrosodiphenylamine	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
4-Bromophenyl-phenylether	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U

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Client Sample ID:	RINSE BLANK B			(SD-2) SD-02			(SD-2DUP) SD-02DUP			SD-01			SD-10		
Lab Sample ID:	42563-14			42574-1			42574-2			42574-3			42574-4		
Sample Date:	06/23/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte							FIELD DUP								
SemiVOCs-8270															
Hexachlorobenzene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Pentachlorophenol	11	U	U	13	U	U	13	U	U	13	U	U	10	U	U
Phenanthrene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Anthracene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Di-n-butylphthalate	2	J	J	5	U	U	5	U	U	5	U	U	4	U	U
Fluoranthene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Pyrene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Butylbenzylphthalate	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
3,3'-Dichlorobenzidine	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Benzo[a]anthracene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Chrysene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Di-n-octylphthalate	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Benzo[b]fluoranthene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Benzo[k]fluoranthene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Benzo[a]pyrene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Indeno(1,2,3-cd)pyrene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Dibenz[a,h]anthracene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Benzo[g,h,i]perylene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2-Methylphenol	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
4-Methylphenol	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
4-Chloroaniline	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2-Methylnaphthalene	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
2,4,5-Trichlorophenol	11	U	U	13	U	U	13	U	U	13	U	U	10	U	U
2-Nitroaniline	11	U	U	13	U	U	13	U	U	13	U	U	10	U	U
3-Nitroaniline	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
Dibenzofuran	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U
4-Nitroaniline	11	U	U	13	U	U	13	U	U	13	U	U	10	U	U
Carbazole	4	U	U	5	U	U	5	U	U	5	U	U	4	U	U

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Client Sample ID:	SD-11			SD-8 SD-08			S SD-09		
Lab Sample ID:	42574-5			42575-1			42575-2		
Sample Date:	08/21/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte									
SemiVOCs-8270									
bis(2-Chloroethyl)ether	5	U	U	4	U	U	4	U	U
Phenol	5	U	U	4	U	U	4	U	U
2-Chlorophenol	5	U	U	4	U	U	4	U	U
1,3-Dichlorobenzene	5	U	U	4	U	U	4	U	U
1,4-Dichlorobenzene	5	U	U	4	U	U	4	U	U
1,2-Dichlorobenzene	5	U	U	4	U	U	4	U	U
bis(2-chloroisopropyl)ether	5	U	U	4	U	U	4	U	U
Hexachloroethane	5	U	U	4	U	U	4	U	U
N-Nitroso-di-n-propylamine	5	U	U	4	U	U	4	U	U
Nitrobenzene	5	U	U	4	U	U	4	U	U
Isophorone	5	U	U	4	U	U	4	U	U
2-Nitrophenol	5	U	U	4	U	U	4	U	U
2,4-Dimethylphenol	5	U	U	4	U	U	4	U	U
bis(2-Chloroethoxy)methane	5	U	U	4	U	U	4	U	U
2,4-Dichlorophenol	5	U	U	4	U	U	4	U	U
1,2,4-Trichlorobenzene	5	U	U	4	U	U	4	U	U
Naphthalene	5	U	U	4	U	U	4	U	U
Hexachlorobutadiene	5	U	UJ	4	U	UJ	4	U	UJ
4-Chloro-3-methylphenol	5	U	U	4	U	U	4	U	U
Hexachlorocyclopentadiene	13	U	U	11	U	U	11	U	U
2,4,6-Trichlorophenol	5	U	U	4	U	U	4	U	U
2-Chloronaphthalene	5	U	U	4	U	U	4	U	U
Acenaphthylene	5	U	U	4	U	U	4	U	U
Dimethylphthalate	5	U	U	4	U	U	4	U	U
2,6-Dinitrotoluene	5	U	U	4	U	U	4	U	U
Acenaphthene	5	U	U	4	U	U	4	U	U
2,4-Dinitrophenol	13	U	UJ	11	U	UJ	11	U	UJ
2,4-Dinitrotoluene	5	U	U	4	U	U	4	U	U
4-Nitrophenol	13	U	U	11	U	U	11	U	U
Fluorene	5	U	U	4	U	U	4	U	U
4-Chlorophenyl-phenylether	5	U	U	4	U	U	4	U	U
Diethylphthalate	5	U	U	4	U	U	4	U	U
4,6-Dinitro-2-methylphenol	13	U	UJ	11	U	UJ	11	U	UJ
n-Nitrosodiphenylamine	5	U	U	4	U	U	4	U	U
4-Bromophenyl-phenylether	5	U	U	4	U	U	4	U	U

Draft DV
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Client Sample ID:	SD-11			SD-8 SD-08			SD-9 SD-09		
Lab Sample ID:	42574-5			42575-1			42575-2		
Sample Date:	06/21/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte									
SemiVOCs-8270									
Hexachlorobenzene	5	U	U	4	U	U	4	U	U
Pentachlorophenol	13	U	U	11	U	U	11	U	U
Phenanthrene	5	U	U	4	U	U	4	U	U
Anthracene	5	U	U	4	U	U	4	U	U
Di-n-butylphthalate	5	U	U	4	U	U	4	U	U
Fluoranthene	5	U	U	4	U	U	4	U	U
Pyrene	5	U	U	4	U	U	4	U	U
Butylbenzylphthalate	5	U	U	4	U	U	4	U	U
3,3'-Dichlorobenzidine	5	U	U	4	U	U	4	U	U
Benzo[a]anthracene	5	U	U	4	U	U	4	U	U
Chrysene	5	U	U	4	U	U	4	U	U
bis(2-Ethylhexyl)phthalate	5	U	U	4	U	U	4	U	U
Di-n-octylphthalate	5	U	U	4	U	U	4	U	U
Benzo[b]fluoranthene	5	U	U	4	U	U	4	U	U
Benzo[k]fluoranthene	5	U	U	4	U	U	4	U	U
Benzo[a]pyrene	5	U	U	4	U	U	4	U	U
Indeno[1,2,3-cd]pyrene	5	U	U	4	U	U	4	U	U
Dibenz[a,h]anthracene	5	U	U	4	U	U	4	U	U
Benzo[g,h,i]perylene	5	U	U	4	U	U	4	U	U
2-Methylphenol	5	U	U	4	U	U	4	U	U
4-Methylphenol	5	U	U	4	U	U	4	U	U
4-Chloroaniline	5	U	U	4	U	U	4	U	U
2-Methylnaphthalene	5	U	U	4	U	U	4	U	U
2,4,5-Trichlorophenol	13	U	U	11	U	U	11	U	U
2-Nitroaniline	13	U	U	11	U	U	11	U	U
3-Nitroaniline	5	U	U	4	U	U	4	U	U
Dibenzofuran	5	U	U	4	U	U	4	U	U
4-Nitroaniline	13	U	U	11	U	U	11	U	U
Carbazole	5	U	U	4	U	U	4	U	U

NEH, Inc. 10 of 1

Industri-Plex, Woburn, MA

✓ NCR at # 10/13/99 ✓ DC @ NEH, Inc. 10/27/99 Surface Water Results

Draft - ✓
10/13/99

Client Sample ID:	SD04 SD-04			RINSE BLANK			SD12 SD-12			SD-13			SD-03		
Lab Sample ID:	42547-1			42547-2			42647-3			42547-4			42551-1		
Sample Date:	06/17/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV	06/18/99	Lab	DV
Units	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.
Analyte															
PCBs/Pesticides-8081A/8082															
Aroclor 1016	0.051	U	U	0.047	U	U	0.042	U	U	0.044	U	U	0.048	U	U
Aroclor 1221	0.051	U	U	0.047	U	U	0.042	U	U	0.044	U	U	0.048	U	U
Aroclor 1232	0.051	U	U	0.047	U	U	0.042	U	U	0.044	U	U	0.048	U	U
Aroclor 1242	0.051	U	U	0.047	U	U	0.042	U	U	0.044	U	U	0.048	U	U
Aroclor 1248	0.051	U	U	0.047	U	U	0.042	U	U	0.044	U	U	0.048	U	U
Aroclor 1254	0.051	U	U	0.047	U	U	0.042	U	U	0.044	U	U	0.048	U	U
Aroclor 1260	0.051	U	U	0.047	U	U	0.042	U	U	0.044	U	U	0.048	U	U
Alpha-BHC	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	UJ
Gamma-BHC	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	UJ
Beta-BHC	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Delta-BHC	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Heptachlor	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	UJ
Aldrin	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Heptachlor Epoxide	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Gamma Chlordane	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Alpha Chlordane	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Endosulfan I	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
4, 4'-DDE	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Dieldrin	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Endrin	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
4, 4'-DDD	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Endosulfan II	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
4, 4'-DDT	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Endrin Aldehyde	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	UJ
Endosulfan Sulfate	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	U
Methoxychlor	0.051	U	U	0.047	U	U	0.042	U	U	0.044	U	U	0.048	U	UJ
Endrin Ketone	0.010	U	U	0.0094	U	U	0.0083	U	U	0.0089	U	U	0.0095	U	UJ
Toxaphene	0.10	U	U	0.094	U	U	0.083	U	U	0.089	U	U	0.095	U	U

Draft DV
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Client Sample ID:	SD-03DEEP			RINSE BLANK			SD-06			SD-07DEEP			SD-07SHALLOW		
Lab Sample ID:	42551-2			42551-3			42551-5			42551-6			42551-7		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV	06/18/99	Lab	DV
Units	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.
Analyte															
PCBs/Pesticides-8081A/8082															
Aroclor 1016	0.042	U	U	0.048	U	U	0.041	U	U	0.042	U	U	0.042	U	U
Aroclor 1221	0.042	U	U	0.048	U	U	0.041	U	U	0.042	U	U	0.042	U	U
Aroclor 1232	0.042	U	U	0.048	U	U	0.041	U	U	0.042	U	U	0.042	U	U
Aroclor 1242	0.042	U	U	0.048	U	U	0.041	U	U	0.042	U	U	0.042	U	U
Aroclor 1248	0.042	U	U	0.048	U	U	0.041	U	U	0.042	U	U	0.042	U	U
Aroclor 1254	0.042	U	U	0.048	U	U	0.041	U	U	0.042	U	U	0.042	U	U
Aroclor 1260	0.042	U	U	0.048	U	U	0.041	U	U	0.042	U	U	0.042	U	U
Alpha-BHC	0.0084	U	UJ	0.0095	U	UJ	0.0082	U	UJ	0.0083	U	UJ	0.0083	U	UJ
Gamma-BHC	0.0084	U	UJ	0.0095	U	UJ	0.0082	U	UJ	0.0083	U	UJ	0.0083	U	UJ
Beta-BHC	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Delta-BHC	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Heptachlor	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Aldrin	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Heptachlor Epoxide	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Gamma Chlordane	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Alpha Chlordane	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Endosulfan I	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
4, 4'-DDE	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Dieldrin	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Endrin	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
4, 4'-DDD	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Endosulfan II	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
4, 4'-DDT	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Endrin Aldehyde	0.0084	U	UJ	0.0095	U	UJ	0.0082	U	UJ	0.0083	U	UJ	0.0083	U	UJ
Endosulfan Sulfate	0.0084	U	U	0.0095	U	U	0.0082	U	U	0.0083	U	U	0.0083	U	U
Methoxychlor	0.042	U	UJ	0.048	U	UJ	0.041	U	UJ	0.042	U	UJ	0.042	U	UJ
Endrin Ketone	0.0084	U	UJ	0.0095	U	UJ	0.0082	U	UJ	0.0083	U	UJ	0.0083	U	UJ
Toxaphene	0.084	U	U	0.095	U	U	0.082	U	U	0.083	U	U	0.083	U	U

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Client Sample ID:	SD-05DEEP			SD-05SHALLOW			RINSE BLANK			RINSE BLANK			RINSE BLANK		
Lab Sample ID:	42551-8			42551-9			42562-3			42563-9			42563-14		
Sample Date:	06/18/99	Lab	DV	06/18/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/23/99	Lab	DV
Units	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.
Analyte															
PCBs/Pesticides-8081A/8082															
Aroclor 1016	0.044	U	U	0.044	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1221	0.044	U	U	0.044	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1232	0.044	U	U	0.044	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1242	0.044	U	U	0.044	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1248	0.044	U	U	0.044	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1254	0.044	U	U	0.044	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Aroclor 1260	0.044	U	U	0.044	U	U	0.040	U	U	0.040	U	U	0.043	U	U
Alpha-BHC	0.0089	U	UJ	0.0088	U	UJ	0.0080	U	U	0.0081	U	U	0.0087	U	U
Gamma-BHC	0.0089	U	UJ	0.0088	U	UJ	0.0080	U	U	0.0081	U	U	0.0087	U	U
Beta-BHC	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Delta-BHC	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Heptachlor	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Aldrin	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Heptachlor Epoxide	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Gamma Chlordane	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Alpha Chlordane	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Endosulfan I	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
4, 4'-DDE	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Dieldrin	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Endrin	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
4, 4'-DDD	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Endosulfan II	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
4, 4'-DDT	0.0089	U	U	0.0088	U	U	0.0080	U	UJ	0.0081	U	UJ	0.0087	U	UJ
Endrin Aldehyde	0.0089	U	UJ	0.0088	U	UJ	0.0080	U	UJ	0.0081	U	UJ	0.0087	U	UJ
Endosulfan Sulfate	0.0089	U	U	0.0088	U	U	0.0080	U	U	0.0081	U	U	0.0087	U	U
Methoxychlor	0.044	U	UJ	0.044	U	UJ	0.040	U	UJ	0.040	U	UJ	0.043	U	UJ
Endrin Ketone	0.0089	U	UJ	0.0088	U	UJ	0.0080	U	UJ	0.0081	U	UJ	0.0087	U	UJ
Toxaphene	0.089	U	U	0.088	U	U	0.080	U	U	0.081	U	U	0.087	U	U

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Client Sample ID:	SD-2	SD-02		SD-2 DUP	SD-02DUP		SD-01			SD-10			SD-11		
Lab Sample ID:	42574-1			42574-2			42574-3			42574-4			42574-5		
Sample Date:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV
Units	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.	µg/L	Qual.	Qual.
Analyte				FIELD DUP											
PCBs/Pesticides-8081A/8082															
Aroclor 1016	0.048	U	U	0.046	U	U	0.045	U	U	0.041	U	U	0.043	U	U
Aroclor 1221	0.048	U	U	0.046	U	U	0.045	U	U	0.041	U	U	0.043	U	U
Aroclor 1232	0.048	U	U	0.046	U	U	0.045	U	U	0.041	U	U	0.043	U	U
Aroclor 1242	0.048	U	U	0.046	U	U	0.045	U	U	0.041	U	U	0.043	U	U
Aroclor 1248	0.048	U	U	0.046	U	U	0.045	U	U	0.041	U	U	0.043	U	U
Aroclor 1254	0.048	U	U	0.046	U	U	0.045	U	U	0.041	U	U	0.043	U	U
Aroclor 1260	0.048	U	U	0.046	U	U	0.045	U	U	0.041	U	U	0.043	U	U
Alpha-BHC	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Gamma-BHC	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Beta-BHC	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Delta-BHC	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Heptachlor	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Aldrin	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Heptachlor Epoxide	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Gamma Chlordane	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Alpha Chlordane	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Endosulfan I	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
4, 4'-DDE	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Dieldrin	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Endrin	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
4, 4'-DDD	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Endosulfan II	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
4, 4'-DDT	0.0095	U	UJ	0.0092	U	UJ	0.0091	U	UJ	0.0082	U	UJ	0.0086	U	UJ
Endrin Aldehyde	0.0095	U	UJ	0.0092	U	UJ	0.0091	U	UJ	0.0082	U	UJ	0.0086	U	U
Endosulfan Sulfate	0.0095	U	U	0.0092	U	U	0.0091	U	U	0.0082	U	U	0.0086	U	U
Methoxychlor	0.048	U	UJ	0.046	U	UJ	0.045	U	UJ	0.041	U	UJ	0.043	U	UJ
Endrin Ketone	0.0095	U	UJ	0.0092	U	UJ	0.0091	U	UJ	0.0082	U	UJ	0.0086	U	UJ
Toxaphene	0.095	U	U	0.092	U	U	0.091	U	U	0.082	U	U	0.086	U	U

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Client Sample ID:	SD-8 SD-08			SD-9 SD-09		
Lab Sample ID:	42575-1			42575-2		
Sample Date:	06/22/99	Lab	DV	06/22/99	Lab	DV
Units		Qual.	Qual.		Qual.	Qual.
Analyte						
PCBs/Pesticides-8081A/8082						
Aroclor 1016	0.053	U	U	0.051	U	U
Aroclor 1221	0.053	U	U	0.051	U	U
Aroclor 1232	0.053	U	U	0.051	U	U
Aroclor 1242	0.053	U	U	0.051	U	U
Aroclor 1248	0.053	U	U	0.051	U	U
Aroclor 1254	0.053	U	U	0.051	U	U
Aroclor 1260	0.053	U	U	0.051	U	U
Alpha-BHC	0.010	U	U	0.010	U	U
Gamma-BHC	0.010	U	U	0.010	U	U
Beta-BHC	0.010	U	U	0.010	U	U
Delta-BHC	0.010	U	U	0.010	U	U
Heptachlor	0.010	U	U	0.010	U	U
Aldrin	0.010	U	U	0.010	U	U
Heptachlor Epoxide	0.010	U	U	0.010	U	U
Gamma Chlordane	0.010	U	U	0.010	U	U
Alpha Chlordane	0.010	U	U	0.010	U	U
Endosulfan I	0.010	U	U	0.010	U	U
4, 4'-DDE	0.010	U	U	0.010	U	U
Dieldrin	0.010	U	U	0.010	U	U
Endrin	0.010	U	U	0.010	U	U
4, 4'-DDD	0.010	U	U	0.010	U	U
Endosulfan II	0.010	U	U	0.010	U	U
4, 4'-DDT	0.010	U	UJ	0.010	U	UJ
Endrin Aldehyde	0.010	U	U	0.010	U	U
Endosulfan Sulfate	0.010	U	U	0.010	U	U
Methoxychlor	0.053	U	UJ	0.051	U	UJ
Endrin Ketone	0.010	U	UJ	0.010	U	UJ
Toxaphene	0.10	U	U	0.10	U	U

Data Usability Review
Metals Analyses
by EPA Methods 6010B (ICP), 7471A (CVAA), and 7000 series (GFAA)
EPA Region I Tier III – type review

Client: Menzie-Cura & Associates, Inc.

Site: Industri-Plex, Woburn, Massachusetts

Laboratory: Woods Hole Group Environmental Laboratory, Raynham, MA

SDG: Lab ETR #s: 42537, 42541, 42562 and 42563

# of samples/Analyses: 14 sediment samples and 5 rinsate blanks for project-specific list of 19 metals

Initial Reviewer: Susan D. Chapnick, New Environmental Horizons, Inc. SDChapnick

Senior Reviewer: Dr. Nancy Rothman, New Environmental Horizons, Inc. N.C.R.

Date Completed: December 09, 1999

The Data Usability Review, representing a Region I Tier III-type validation, was performed on the data package. The intentions of this review are:

1. To determine if the data were generated and reported in accordance with the following:
    - EPA SW-846 Methods 6010B for ICP, 7471A for CVAA, and 7000 series for GFAA;
    - *Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts,* July 1999;
    - Region I, EPA-NE *Data Validation Functional Guidelines for Evaluating Environmental Analyses,* 12/96;
    - *Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses,* February 1989.
2. To determine if the data met the program data quality objectives for acceptable accuracy, precision, and sensitivity.
3. To determine and define the technical usability of the data based on the accuracy, precision, and sensitivity QA/QC indicators defined in the site QAPP.
4. To update the project database with appropriate data quality qualifiers.

The Data Usability Review consists of five sections. Section I is the Overall Summary of Data Usability including subsections addressing technical usability, accuracy, precision, representativeness, and sensitivity of the data. Sections II through V are hand-completed checklists: Section II - Data Package Completeness Review; Section III - Review of the Laboratory Data Summary Forms and Additional QA/QC Parameters; Section IV - Review of Overall Data Package Compliance; and Section V - Example Sample Calculations.

I. Overall Summary of Data Usability

A. Summary of Technical Usability

All sediment and rinsate blank results for metals included in the laboratory data package reviewed, identified by Woods Hole Group Environmental Laboratory (WHG) as project numbers (ETRs) 42537, 42541, 42562 and 42563 are usable for project objectives. Results have been estimated (J) for several metals in these samples due to quality control criteria exceedances or uncertainty in the results near the laboratory method detection limit (MDL). Data users should note the following uncertainties in the estimated results. The estimated results are usable for project objectives of risk assessment.

B. Technical Issues Affecting Accuracy

Holding times, calibration criteria, laboratory control sample recoveries, matrix spike recoveries, and other method-specific QC sample results were reviewed to evaluate the accuracy of the sediment results.

The accuracy for antimony and selenium in all sediments was compromised based on low matrix spike recoveries of 44.6% and 54.8%, respectively. All antimony and selenium results were estimated (J) and may be biased low.

The LCS used was matrix-matched for all metals except silver. The silver LCS was an aqueous laboratory-fortified blank. The laboratory stated in their case narrative that had been obtaining variable recoveries from the solid LCS for silver that they were using for other metals. Therefore, they performed an aqueous LCS to evaluate method performance during digestion and analysis. No action was taken to qualify the silver results because the matrix spike sediment result was acceptable for silver indicating acceptable accuracy in the sediment matrix.

All other quality control information, such as holding times, LCS recoveries, and calibration QC, associated with accuracy met QAPP and method criteria for the other metals results in these sediment samples.

C. Technical Issues Affecting Precision and Representativeness

The relative percent difference (RPD) between sample and matrix (lab) duplicate results and between field duplicate pair results were evaluated to assess precision and representativeness of the sediment data.

Precision, based upon the relative percent difference (RPD) of the matrix duplicate results, was acceptable for metals in the sediment samples. Note that precision could not be evaluated for thallium in the matrix duplicate results, as these results were non-detected.

C. Technical Issues Affecting Precision and Representativeness - continued

One field duplicate pair was associated with these sediments: SD-05 and SD-05DUP. The field duplicate pair results showed imprecision for four metals based upon high relative percent difference (RPD) between field duplicate results (RPD in parentheses): antimony (56%), barium (60%), selenium (63%), and thallium (54%). These metal results in the field duplicate pair samples were estimated (J) and are imprecise. Poor field duplicate precision is an indication of sample matrix heterogeneity. Sediment heterogeneity may affect the representativeness of the sediment to the site location.

D. Technical Issues Affecting Sensitivity

Blank contamination in method blanks, field rinsate blanks, and initial and continuing calibration blanks, along with an evaluation of the laboratory MDLs were reviewed to assess sensitivity of the results compared to QAPP-required reporting limits.

Sensitivity was acceptable for all sediment sample results compared to the project-specific reporting limits defined in Table 1-7 of the site QAPP (July 1999). Though low-level contamination of several metals was observed in the associated laboratory and rinsate blank results, the sediment results were greater than the calculated blank action levels. Therefore, no blank actions were taken. Several results in the rinsate blanks were estimated (J) due to potential uncertainty near the MDLs. No actions were taken to qualify the rinsate blanks based on laboratory method blank results.

The "as received," or native, sediments all had % solids < 30%. The freeze-drying process removed a significant portion of the water content of these samples such that all freeze-dried % solids were > 40%. The increase in solids content of these samples contributed to the acceptable sensitivity of the metals measurements by decreasing the achievable sample-specific reporting levels (on a dry-weight basis).

E. Additional Technical and QA/QC Issues

A review of method compliance, an evaluation of method modifications, and other QA/QC issues were made to evaluate the comparability of the data generated for the project uses.

Several detected results for beryllium, silver, and thallium, that were not previously qualified or negated for other QC criteria, were estimated (J) due to uncertainty of the quantitation at levels less than the 5x the MDL and less than the project-required reporting limit.

F. Summary of Completeness, Documentation, and Chain-of-Custody Issues

Chain-of-custody (COC) documentation of temperature on receipt at the laboratory was missing for several COCs. For samples received 6/21/99, a receipt temperature of 7°C was recorded. This exceeds the criterion of 4 $\pm$ 2 °C. The samples were collected in the summer and immediately sent via courier to the laboratory. Only surface water samples were collected associated with this COC. It appears that they did not have a chance to cool-down completely by the time they were received at the laboratory. No action was taken other than to note this discrepancy.

Indication of "sediment" or "surface water" for the association of the five-rinsate blanks was not made on the chain-of-custodies. However, personal communication with the sampler, Peter Kane of Woods Hole Group Environmental Laboratory, confirmed that the rinsate blanks were taken as rinses of the Eckman grab samplers used for sediment collection.

Times of sampling were not recorded on the chain-of-custody's for the sampling done on June 21 through June 23, 1999.

The laboratory data package was missing Form 14, Analysis Run Log, for some silver analyses by GFAA. The raw instrument data were included with a hand-completed run log. Therefore, no action was taken other than to note this discrepancy.

NEH generated a data summary table based on the project data file supplied by the laboratory including the corrections and qualifications added to the data based on this Data Usability Review. The data summary table of technically valid and usable results for sediments reviewed by NEH is attached to this report.

✓ DWC 12/9/99

Industri-Plex, Woburn, MA
Metals - Sediment

Validated 12/09/99
NEH, Inc.

Sample Location ID:		SD-01			SD-02			SD-03			SD-04		
Lab_ID:		42562-4			42562-1			42541-1			42537-1		
Date Sampled:		06/21/1999	Lab	DV	06/21/1999	Lab	DV	06/18/1999	Lab	DV	06/17/1999	Lab	DV
Units:		mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.
Freeze-Dried Percent Solids (%)		87.0%		[Bias]	92.3%		[Bias]	77.7%		[Bias]	67.0%		[Bias]
Analyte - Metals		Reference Location			Reference Location			Reference Location			Reference Location		
EPA Methods 6010 and 7000 series													
Aluminum		4740			8620			15200			10200		
Antimony		0.81	N	J [low]	1.4	N	J [low]	0.93	N	J [low]	1.2	N	J [low]
Arsenic		12.2			29.9			21.4			32.7		
Barium		59			80.7			89.6			108		
Beryllium		0.39	B	J	1.1			0.95			0.71		
Cadmium		0.5			2.9			2.8			6.1		
Chromium		12.2	E		155	E		46.2	E		311	E	
Cobalt		6.4			12.1			13.2			21.0		
Copper		31.6			65.7			75			290		
Iron		11700			25500			20300			36400		
Lead		188			197			153			49.0		
Manganese		396			837			383			1520		
Mercury		0.31			0.35			0.26			0.6		
Nickel		9.2			19.6			24.3			25.8		
Selenium		0.94	N	J [low]	1.2	N	J [low]	0.88	N	J [low]	1.5	N	J [low]
Silver		0.085	B	J	0.47			0.9			0.75		
Thallium		0.36	U	U	0.45	U	U	0.55	U	U	0.62	U	U
Vanadium		20.0			51.5			43.5			50.2		
Zinc		131			377			457			590		

U-Analyte was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. Bias- QC showed a low or high bias in accuracy of estimated result. If bias not indicated, bias is unknown.

Industri-Plex, Woburn, MA
Metals - Sediment

Validated 12/09/99
NEH, Inc.

ample Location ID:	SD-05			SD-05DUP			SD-06			SD-07		
ab_ID:	42563-1			42563-3			42563-12			42563-10		
ate Sampled:	06/22/1999	Lab	DV	06/22/1999	Lab	DV	06/23/1999	Lab	DV	06/23/1999	Lab	DV
nits:	mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.
eeze-Dried Percent Solids (%)	97.3%		[Bias]	55.1%		[Bias]	87.7%		[Bias]	61.1%		[Bias]
nalyte - Metals				Field Duplicate								
PA Methods 6010 and 7000 s												
luminum	14000			13400			10400			15000		
ntimony	8.0	N	J [low]	4.5	N	J [low]	9.6	N	J [low]	3.6	N	J [low]
rsenic	956			1250			273			2390		
arium	104		J	193		J	49.2			119		
eryllium	1.9			1.7			1.0			1.4		
admium	25.5			26			15			20.9		
hromium	428	E		417	E		790	E		476	E	
obalt	15.3			13.6			27.5			19.9		
opper	794			785			824			571		
on	66400			76600			39600			116000		
ead	418			415			567			421		
langanese	732			706			358			891		
lercury	1.8			1.9			2.4			1.4		
ickel	28.1			25.8			27.8			30.4		
elenium	1.5	N	J [low]	2.9	N	J [low]	2.4	N	J [low]	2.5	N	J [low]
ilver	1.3			1.3			2.0			1.2		
hallium	0.69	B	J	1.2	B	J	2.0			0.82	B	J
anadium	83.4			76.3			38.9			75.2		
inc	3770			2990			3710			3310		

U-Analyte was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. Bias- QC showed a low or high bias in accuracy of estimated result. If bias not indicated, bias is unknown.

Industri-Plex, Woburn, MA
Metals - Sediment

Sample Location ID:	SD-08			SD-09			SD-10			SD-11		
Lab_ID:	42563-7			42563-5			42562-6			42562-8		
Date Sampled:	06/22/1999	Lab	DV	06/22/1999	Lab	DV	06/21/1999	Lab	DV	06/21/1999	Lab	DV
Units:	mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.
Freeze-Dried Percent Solids (%)	78.0%		[Bias]	41.7%		[Bias]	78.7%		[Bias]	81.3%		[Bias]
Analyte - Metals												
EPA Methods 6010 and 7000 s												
Aluminum	7120			17500			7540			11000		
Antimony	1.8	N	J [low]	7.3	N	J [low]	2.3	N	J [low]	3.6	N	J [low]
Arsenic	594			802			639			1200		
Barium	75.8			96.8			73.6			129		
Beryllium	0.93			1.9			0.9			1.1		
Cadmium	24.9			29.7			14.4			20.6		
Chromium	244	E		641	E		361	E		477	E	
Cobalt	42.4			75.1			43.1			27.3		
Copper	333			1110			356			527		
Iron	110000			111000			94800			138000		
Lead	129			397			116			200		
Manganese	1580			2090			2300			1280		
Mercury	0.78			3.8			1.8			3.6		
Nickel	19.9			44.0			21.1			20.1		
Selenium	2.1	N	J [low]	5.5	N	J [low]	2.5	N	J [low]	3.6	N	J [low]
Silver	0.41			1.1			0.32	B	J	0.69		
Thallium	1.0	B	J	2.1			0.42	U	U	0.41	U	U
Vanadium	34.4			57.1			30.8			48.0		
Zinc	6340			7420			4040			4900		

U-Analyte was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. Bias- QC showed a low or high bias in accuracy of estimated result. If bias not indicated, bias is unknown.

Industri-Plex, Woburn, MA
Metals - Sediment

Validated 12/09/99
NEH, Inc.

mple Location ID:	SD-12			SD-13		
b_ID:	42537-4			42537-6		
te Sampled:	06/17/1999	Lab	DV	06/17/1999	Lab	DV
its:	mg/Kg dry weight	Qual.	Qual.	mg/Kg dry weight	Qual.	Qual.
eeze-Dried Percent Solids (%)	83.6%		[Bias]	79.1%		[Bias]
alyte - Metals	Reference Location					
'A Methods 6010 and 7000 s						
uminum	7520			18100		
itimony	0.71	N	J [low]	2.8	N	J [low]
senic	22.8			339		
irium	70.5			71		
eryllium	0.52			1.1		
admium	1.2			5.3		
iromium	198	E		956	E	
obalt	9.2	B		21.4		
opper	36.3			486		
on	17800			55000		
ead	153			647		
anganese	1180			1150		
ercury	0.42			3.4		
ckel	10.9			30.6		
elenium	1.2	N	J [low]	2.1	N	J [low]
lver	0.2	B	J	1.0		
iallium	0.49	U	U	0.52	U	U
anadium	23.7			64.6		
nc	234			1200		

U-Analyte was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. Bias- QC showed a low or high bias in accuracy of estimated result. If bias not indicated, bias is unknown.

✓ [initials] 12/8/99

Industri-Plex, Woburn, MA
Metals Rinsate Blanks for Sediment Sampling

Validated 12/08/99
NEH, Inc.

Sample Location ID:	Rinse Blank			Rinse Blank			Rinse Blank			Rinse Blank			Rinse Blank		
Lab_ID:	42547-2			42551-3			42562-3			42563-9			42563-14		
Date Sampled:	06/17/1999	Lab	DV	06/18/1999	Lab	DV	06/21/1999	Lab	DV	06/22/1999	Lab	DV	06/23/1999	Lab	DV
Units:	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.	ug/L	Qual.	Qual.
Analyte - Metals															
EPA Methods 6010 and 7000 series															
Aluminum	227			63	B	J	31.9	B	J	34.5	B	J	818		
Antimony	2	B	J	1.7	U	U	1.7	U	U	1.7	U	U	1.7	B	J
Arsenic	1.1	U	U	1.1	U	U	1.1	U	U	1.4	B	J	1.4	B	J
Barium	3.5	B	J	1.7	B	J	1.2	U	U	1.2	U	U	1.6	B	J
Beryllium	1.4	B	J	1	B	J	0.62	B	J	0.98	B	J	0.98	B	J
Cadmium	0.21	U	U	0.21	U	U	0.21	U	U	0.21	U	U	0.21	U	U
Chromium	9.1	B	J	9.1	B	J	8.4	B	J	12.9	B	J	11.1	B	J
Cobalt	3.7	U	U	3.7	U	U	3.7	U	U	3.7	U	U	3.7	U	U
Copper	8.4	B	J	5.8	B	J	11.3	B		9.4	B	J	11.4	B	
Iron	59.6	B	J	28.5	B	J	50.9	B	J	80.8	B		88.8	B	
Lead	64.8	U	U	64.8	U	U	64.8	U	U	64.8	U	U	64.8	U	U
Manganese	7.3	B	J	4.6	U	U	4.6	U	U	4.6	U	U	4.6	U	U
Mercury	0.04	U	U	0.04	U	U	0.04	U	U	0.04	U	U	0.04	U	U
Nickel	7.9	U	U	7.9	U	U	7.9	U	U	7.9	U	U	7.9	U	U
Selenium	1.3	U	U	1.3	U	U	1.3	U	U	1.3	U	U	1.3	U	U
Silver	0.17	U	U	0.17	U	U	0.17	U	U	0.17	U	U	0.17	U	U
Thallium	1.9	U	U	1.9	U	U	1.9	U	U	1.9	U	U	1.9	U	U
Vanadium	3.6	U	U	3.6	U	U	3.6	U	U	3.6	U	U	3.6	U	U
Zinc	9.8	B	J	18.4	B		38.4			25.2	B		12.8	B	J

U-Analyte was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to uncertainty near the laboratory method detection limit (MDL).

Sediment 12/9/99

DC at NEH, Inc.

Data Usability Checklist Review - Inorganics
Industri-Plex Site, Woburn, MA
Ecological and Human Health Environmental Investigations 1999

II. Data Package Completeness

Laboratory: Woods Hole Group Env. Lab SDG: 42562, 42541, 42537, 42563

a. Review the data package for completeness based on EPA Region I and Site QAPP requirements.

b. Were all required reporting forms and associated raw data included in the data package? **Yes / No**. If no, contact laboratory for resubmittals and attach copy of resubmittal request to this checklist.

c. Were Form 1s (result forms) and raw ~~data~~ for all samples listed in the laboratory case narrative included in the data package? **Yes / No**. Were all sample analyses requested on the Chain-of-Custody performed by the laboratory? **Yes / No**.

Indicate missing information or analytical issues in the section below.

Summarize the number and types of samples in this SDG:

13 sediments + 1 Field Duplicate for 19 metals (project-specific list)

sediments were freeze-dried prior to preparation and analyses.

5 Rinsate blanks were associated with these sediments. 3 of them were included in this lab data package and 2 of them were included in the surface water data package. The data summary spreadsheet for the rinsate blanks is included with this report.

III. Review of CLP-Like Summary Forms and Additional QA/QC Parameters

A. Holding Times/Preservation Criteria

1. Were holding times/preservation criteria met for all samples/analyses as indicated below? **Yes / No.**

Metals	180 days from date of collection, preserved to pH < 2 and 4°C
Mercury	28 days from date of collection, preserved to pH < 2 and 4°C
Cyanide	14 days from date of collection, preserved to pH > 12 and 4°C
AVS/SEM	14 days from date of collection, kept at < 4°C

If no, list the affected samples/analytes and the number of days outside of the holding time or preservation issues in the table, below.

Actions: If the holding times were exceeded, estimate (J and UJ) positive and nondetect results. If the holding times were grossly exceeded, estimate (J) positive results and reject (R) nondetect results. If samples were improperly preserved, use professional judgment – may estimate (J and UJ) associated results.

Holding Time / Preservation Actions

Analyte	Holding Time Exceedance	Preservation Issue	Action / Bias	Affected Sample(s) / Comments
		NONE		

Temperature upon receipt not recorded on all COCs. Most recorded 4°C, some not recorded, one on 6/21/99 received at 7°C – (pg 378 of pkg) This is because samples were taken in the summer + couriered to the lab

DC 12/9/99

immediately following collection - therefore, they did not have a chance to cool down

B. Calibration

1. Instrument Calibration

Instrument calibrations were reviewed to ensure that the laboratory followed the correct method procedures.

a. Review Form 14, Analysis Run Log.

b. Were instrument calibrations performed daily for all methods/instruments used for analysis? **Yes / No.**

c. Were the proper number of standards used for each calibration as compliant with SW846 Method requirements? **Yes / No.**

d. Were the calibration curves compliant with linearity requirements of the SW846 Method if a linear curve was used ($r \geq 0.995$)? Yes.

If no to any of the above, list affected samples/analytes and actions in the comment section, below.

2. Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) Standards

All ICVs and CCVs were reviewed to assess the accuracy and sensitivity of the results.

a. Review Form 2A, Inorganics Initial and Continuing Calibration Verification.

b. Did all ICVs and CCVs meet the recovery criteria? **Yes / No**. If no, list the outliers and the affected samples in the comment section, below.

Actions: If the ICV/CCV recovery criteria exceeded the defined limits indicated below, estimate (J) associated positive results; no action is required for nondetect results. If ICV/CCV recoveries were below defined QC limits, estimate (J and UJ) associated positive and nondetect results.

<u>Control Limits</u>

Metals:	90-110%
Mercury:	80-120%
Cyanide:	85-115%
AVS/SEM:	85-115% (lab limits)

Comments:

NONE

B. Calibration (continued)

2. Low Level Standard [Contract Required Detection Limit (CRDL)] Analysis

The Low Level Standard, or Contract Required Detection Limit (CRDL), is a direct measure of the instrument sensitivity near the detection limit.

a. Review Form 2B, Inorganic CRDL Standard for AA and ICP

b. Were the CRDL standards analyzed at the correct concentrations? **Yes / No.**

c. Did all CRDL standard results meet project or lab recovery criteria? **Yes / No.**

If no, list the samples/analytes affected and actions in the table, below.

Actions: If the CRDL recovery was greater than 150% (lab criteria), estimate (J) all positive results which were < 10x RL; no action is required for non-detects. If the CRDL recovery was less than 50% (lab criteria), estimate (J and UJ) positive and nondetect results <10x RL.

Low Level Standard (CRDL) Recovery Actions

Analyte	% Recovery CRDL Standard	Action / Bias	Affected Sample(s) / Comments
			NONE

C. Blank Results

1. Laboratory Blanks

Laboratory (preparation and calibration) blank results were reviewed to assess the presence of contaminants that ultimately affect the accuracy and sensitivity of the results. Blanks were assessed compared to the project-specific reporting limits (RL) listed in Table 1-7 of the Industri-Plex QAPP and to the laboratory MDLs.

a. Review Form 3, Inorganic Blanks

b. Were all analytes detected in the laboratory blanks at levels less than the MDL? **Yes / No.** If no, list below the analyte and blank level for the highest detected result above the MDLs.

c. Were negative baseline drifts, if observed as negative ICB/CCB or preparation blank results, observed at absolute values less than 2x the MDL? **Yes / No.** If no, list below the analyte and blank level for the negative result with an absolute value above 2x the MDL.

Analyte	Lab Blank Result (Units)
Be	1.3 ug/L
Cr	9.1
Cu	6.9
Ni	20.0
Hg	0.009
Cd	3.7

lab reported re-analysis of PBS for ICP on 7/26/99 - ref.
Not required since initial analysis was compliant.
(Reanalysis showed slight contamin. for subset of metals - No action).

No actions were taken to qualify rinsate blank
[illegible] 12/9/99

C. Blank Results (continued)

2. Field Blank Results

Field blank results were reviewed to assess the presence of contaminants that ultimately affect the accuracy and sensitivity of the sample results.

a. Was there a field rinsate blank (RB) associated with the samples in this SDG? **Yes** / **No.** If yes, list the field blank(s) and the associated samples in the table below.

Field Rinsate Blank Sample ID	Associated Field Sample IDs
Rinse Blank 6/17/99	SD-04, SD-12, SD-13
Rinse Blank 6/18/99	SD-03
Rinse Blank 6/21/99	SD-01, SD-02
Rinse Blank 6/22/99	SD-05, SD-05DUP
Rinse Blank 6/23/99	SD-06, SD-07

b. Were all analytes detected in the field blank(s) at levels less than the MDL? **Yes** / **No.** If no, list contaminants below.

NOTE: Use the maximum field blank concentration in cases where multiple field blanks are associated with the samples in a given SDG.

Field Blank ID: Rinse Blank 6/17/99

Analyte	Field Blank Result (Units) ug/L	6/18/99	6/21/99	6/22/99	6/23/99
Al DC 12/9/99	~~59~~ 227 ug/L	63	31.9	34.5	818
Sb	2	—	—	—	1.7
Ba	3.5	1.7	~~0.63~~	—	1.6
Be	1.4	1.0	0.62	0.98	0.98
Cr	9.1	9.1	8.4	12.9	11.1
Cu	8.4	5.8	11.3	9.4	11.4
Fe	59.6	28.5	50.9	80.8	88.8
Mn	7.3	—	—	—	—
Zn	9.8	18.4	38.4	25.2	128
As	—	—	—	1.4	1.4

C. Blank Results (continued)

Actions: Blank Contamination: Determine the maximum concentration of each analyte based upon a review of all laboratory blanks (preparation blanks, calibration blanks) and field rinsate blank results. Sample results which were greater than the MDL but less than 5 times the amount found in the associated blank and less than the RL are negated (qualified U). Sample results which are greater than the RL but less than 5 times the amount found in the associated blanks are qualified "B" to indicate that the analyte was also found in the associated blank(s). Data flagged "B" may be biased high. No actions are taken for results greater than 5x the blank level.

Negative Baseline Drift: Any blank reported with a negative result for which the absolute value was greater than 2x the MDL, are evaluated for this project using the absolute value of the blank result as the rule for action. If the sample result was > MDL but < the absolute value of the blank concentration, estimate the nondetect and detect results (UJ and J). These results may be biased low. No actions are taken for results greater than the absolute value of the blank level (negative baseline drift).

sediment prep factors for conversion: initial wt 2g → 50 ml final volume

only recorded highest blank - No Actions required

Analyte	Maximum Blank Concentration (Units)	Blank Action Level (Units)	Actions/Affected Samples
al	227 ug/L	28.4 mg/Kg	NONE
al	63	7.9	
al	31.9	4.0	
al	34.5	4.3	
al	818	102	
as	1.4	0.18	
Sb	2.0	0.25	
Ba	3.5	0.44	
Be	1.4	0.18	
Cr	12.9	1.6	
Cu	11.4	1.4	
Fe	88.8	11.1	
Mn	7.3	0.91	
Zn	128	16	

No Blank Actions required - all sediment results were greater than the highest Blank

D. Matrix QC Results

1. Matrix Spike Recoveries

Matrix spike (MS) results were reviewed to assess the accuracy of the results relative to the specific sample matrix.

a. Review Form 5A, Spike Sample Recovery

b. Were matrix spike (MS) results present for all analytes at the proper frequency as required ~~by the~~ Site QAPP? **Yes / No.** Were matrix spike recovery criteria met for all analytes? **Yes / No.**

List the affected analytes and actions in the table below.

Actions: If the spike recovery was > 125%, estimate (J) all positive results. No action is taken for non-detects. If the spike recovery fell within the range of 30-74%, estimate (UJ or J) all sample results. If the spike recoveries were less than 30%, reject (R) the nondetect results as unusable and estimate (J) the positive results for extremely low bias.

If the sample concentration exceeds the spike-added concentration by a factor of 4 or more, no action is taken because the spike level was "swamped-out" by the native concentration in the sample.

Matrix Spike (MS) Accuracy Action Table

Analyte	MS % Recovery	Action	Comments/Affected Samples
Al	58.4	NONE	Sample Result > 4x spike level
Sb	44.6	J	all results potential low bias.
As	1878.7	NONE	Sample Result > 4x spike level
Fe	33.0	"	" " " " "
Se	54.8	J	all results potential low bias

Note: post-digestion spike for Se also low 58% - confirms matrix suppression.

D. Matrix QC Results (continued)

2. Sample/Matrix Duplicate Results

Matrix (laboratory) duplicate (MD) results were reviewed to access the precision of the results relative to the specific sample matrix.

a. Review Form 6, Inorganic Duplicates

b. Were matrix duplicate (MD) analyses present for all analytes at the proper frequency as required by the Site QAPP? **Yes / No.** Were criteria as defined below, met for all analytes? **Yes / No.**

List the analytes affected and actions in the table below.

Site QAPP Control Limits:	Waters	RPD < 20% for results > 5x RL
		difference ± RL for results < 5x RL
	Soils	RPD < 35% for results > 5x RL
		difference ± 2x RL for results < 5x RL

Actions: Estimate (J and UJ) all results for analytes which do not meet precision criteria.

Matrix Duplicate (MD) Precision Action Table

Analyte	MD RPD	Action	Comments/Affected Samples
			NONE

Could not evaluate for Tl because results were ND.

D. Matrix QC Results (continued)

3. Field Duplicate Precision

Field duplicate sample results were reviewed to assess representativeness of the sample aliquot to the area sampled and the precision of the results relative to field sampling techniques.

a. Review Form 1, Inorganic Analysis Data Sheet, for the field duplicate sample analyses results.

Actions: If field duplicate precision exceeded criteria, below, for any analyte, estimate (J) positive results for the affected analytes in the field duplicate pair only. If severe imprecision was noted in the field duplicate results, qualify the remainder of the associated field sample data based on sound technical judgment.

Site QAPP Control Limits:	Waters	RPD < 30% for results > 5x RL
		difference ± RL for results < 5x RL
	Soils	RPD < 50% for results > 5x RL
		difference ±2x RL for results < 5x RL

Use professional judgment for results < 5x RL that do not meet the RPD criteria, above. [As guidance, Region 1 defines the following control limits: control limit of ± 2x CRDL for water and ± 4x CRDL for soil for results that are < 5x CRDL.]

Field Duplicate (FD) Precision/Representativeness Action Table FD: SD-05
SD-05DUP

Analyte	FD RPD	Action	Comments/ Associated Samples
Antimony	56 %	J	Both results in FD pair
Barium	60 %	J	" " " " "
Selenium	63 %	J	" " " " "
Thallium	54	J	" " " " "

evidence of heterogeneity in imprecision of several of metals in FD pair.

E. Method QC

1. Laboratory Control Sample Recoveries

The laboratory control sample (LCS) recoveries were reviewed to assess the accuracy of the results relative to the laboratory method performance of each step during the preparation, analysis, and reporting of environmental samples.

a. Review Form 7, Inorganic Laboratory Control Sample

b. Was an appropriate (soil, sediment, or water) LCS performed for all analytes at the proper frequency?
Yes / No. *

c. Did all analytes meet Site QAPP recovery criteria? Yes / No.

If no, list the affected analytes and actions in the comment section, below.

Actions: If the LCS recovery for any analyte was greater than 120% or the established upper soil or sediment control limit, estimate (J) all positive sample results. If the LCS recovery was less than 80% or less than the established lower soil or sediment control limit, estimate (J and UJ) the results. Use professional judgment if LCS is severely low (< 50%, EPA Region I criterion) to reject (R) associated results as unusable.

Comments:
* Soil/Sediment LCS run for all metals except for ~~anti~~ silver. Water LCS run for Silver. No Action taken.

Aqueous LCS analyzed with rinsate blank samples.

DC 12/15/99

E. Method QC (continued)

2. ICP Method QC - ICP Interference Check Sample Results

ICP interference check procedures were performed to evaluate and verify the laboratory's interelement and background corrections for ICP analyses.

a. Review Form 4, ICP Interference Check Sample

b. Were analyte levels in the ICSA and ICSAB reported for all metals? **Yes / No**. Was the ICSA and ICSAB analyzed as the correct frequency as defined in SW846? **Yes / No**. Did all analytes meet recovery criteria of 80-120% in the ICSAB solution? **Yes / No**.

c. Were the absolute values of the reported results for analytes in the ICSA check solution, other than Al, Ca, Fe, and Mg, less than 2x RL? **Yes / No**

d. Were the major interfering analytes (Al, Ca, Fe, and Mg) within linear range of the ICP instrument? **Yes / No.** If no, were appropriate dilutions made to bring the interferent within linear range? **Yes / No**. If no, evaluate interferences based on lab IECs and Linear Range analyses and describe any actions taken, based on professional judgment and calculations to estimate the level of interference, below.

e. Were other interfering analytes (Na) within linear range of the ICP? **Yes / No.** If no, evaluate potential physical interferences and take actions to estimate (J and UJ) affected analytes based on professional judgment. Include any actions below. Sodium not required for analysis on sediments - raw data scanned - Sodium within linear range.

If no to any of the above, list the affected samples, analytes, concentrations and actions in the section, below.

Comments:

V at 40 ug/L + 46 ug/L in ICSA
No action taken because sediment sample concentrations were greater than 10X this level. Also diluted + undiluted results for V shown acceptable agreement. No evidence of interference. No action taken.

E. Method QC (continued)

3. ICP Serial Dilution Results

   a. Review Form 9, Inorganic ICP Serial Dilution

   b. Was a field sample used for ICP serial dilution analysis? **Yes / No.**

   c. Did all analytes meet criteria for %D in the serial dilution results? **Yes / No.**

List the affected samples/analytes and actions in the table below.

Actions: Estimate (J) all positive results if the %D > 15% for results that are > 50x the MDL.

Serial Dilution Result Actions

Analyte	% Difference	Action / Affected Samples
	NONE	

F. Verification of IDLs, Linear Ranges, IECs

1. Instrument Detection Limits

Analyte detection limits were reviewed to assess if the sensitivity of the results met the project-specific requirements.

a. Review Form 10, or equivalent. For this project, Method Detection Limits (MDL) must be performed annually.

b. Were current (annual) MDLs present for all analytes and all instruments used for analysis? **Yes / No.**

c. Were the MDLs compliant with project-specific reporting limit requirements as listed in Table 1-7 of the Site QAPP? **Yes / No.**

Actions: If no, estimate (J or UJ) all affected results that are < 10X MDL due to the uncertainty in the level of detection. List any actions in the Comments section, below.

2. ICP Interelement Correction Factors

a. Review Form 11, or equivalent, ICP Interelement Correction Factors (Annually)

b. Were the current (annual) IECs present in the data package? **Yes / No.**

Actions: If no, use professional judgment to determine the severity of the affect on the results.

3. ICP Linear Ranges (Annual)

a. Review Form 12, or equivalent, ICP Linear Ranges are checked daily and updated, at a minimum, annually for this project.

b. Were current (annual) linear range data present in the data package? **Yes / No.**

Actions: If no, use professional judgment to determine the severity of the affect on the results.

If no to questions for Forms 10, 11, or 12, list the affected samples/analytes and actions in the comment section, below.

Comments:

NONE -
Note that lab hand-wrote "DL" column on Form 10's. These were incorrect - however MDLs were compliant as < project reporting limits - therefore, no action taken.

G. Preparation and Analysis Logs

1. Preparation Log

   a. Review Form 13, Inorganic Preparation Log

   b. Were ~~sample~~ preparation logs present and do they contain all samples/analytes performed in the SDG? **Yes / No.**

2. Analysis Run Log

   a. Review Form 14, Inorganic Analysis Run Log

   b. Were analysis run logs present for all required samples/methods for this SDG? **Yes / No** see below

   c. Was the correct analytical sequence followed for the QC for each method? **Yes / No.**

   d. Were the calibration standards (*i.e.*, CCVs, CCBs, CRDL, ICSA, and ICSAB) analyzed at the proper frequency consistent with the Site QAPP? **Yes / No.**

If no to questions for Form 13 or 14, list the affected samples/analytes and actions in the comment section, below.

Comments:

Missing a Form 14 for some Ag analyses by GFAA. Data are included in package - no action.

H. Additional QA/QC Issues

1. Percent Solids

Percent solids data were reviewed to further assess the affect of the sample matrix on result quantitation.

a. Review percent solids results for all soil and sediment samples on the Form 1s. Note that for this project, all sediment samples were freeze-dried prior to analysis for total metals. The freeze-dried percent solids is used to calculate the total metals results on a dry-weight basis; therefore, the freeze-dried percent solids is used to compare to EPA Region I DV criteria. For AVS/SEM, the "as-received" percent solids is used as AVS is volatile and freeze-drying cannot be performed.

b. Were percent solids > 30% for all soil samples? Yes / No. after freeze-drying

If no, list affected samples and actions in the table, below.

Actions: If percent solids results were > 30%, no actions are required. If percent solids were < 30% but > 10%, reject all non-detected results (R) and estimate (J) all detected results. If percent solids were <10%, reject (R) all results. Professional judgment may be used to modify these actions. For example, AVS/SEM must be analyzed on the "as received" sediment without the freeze-drying preparation because AVS is volatile and may be lost upon freeze-drying. AVS/SEM data will not be rejected due to low percent solids because the molar ratio information is useful to the ecological risk assessors even in low percent solids sediments. The data may be estimated (J and UJ) based on professional judgment.

Percent Solids Action Table

Sample ID	% Solids	Action / Comments

2. Sample Result Verification

Sample results were reviewed to assess quantitation of results near the Reporting Limits.

a. Review all sample results on the Form 1s.

b. Were sample results < RL flagged with a "B" by the laboratory? Yes No

Uncertainty in result quantitation near the RL may exist for results that are flagged "B" because they are between the MDL and project RL.

Action: Estimate (J) all results between the lab MDL and the project RL that have not been previously estimated "J" due to other QC criteria. In other words, convert all "B" flags to "J" due to potential uncertainty near the MDL at levels below the RL. List the analytes that were affected in the table below.

Estimate (J) Results between MDL and RL
[Convert all "B" flags from Lab to "J" for the following analytes]

"J" flagged values < 5x MDL. (includ prep factors + dilutions. Note: most samples run at no dilution). 12/9/99

Analyte	# of affected results / matrix	Comments
Silver	3 sediments	— SD-01, SD-10, SD-12
Thallium	~~1~~ 2 "	— SD-07, SD-08
Beryllium	1 sediment	— SD-01
Rinsate blank results that were estimated (J). Note that "B" flag from lab on rinsate blank data did not always convert to "J" – see below.		

12/9/99

Note: Some data were flagged "B" by lab that were >5x MDL. In such cases the "B" flag was removed in the final data validation qualification actions.

~~III.~~ IV. Review of Overall Data Package Compliance

Review of the overall data package was performed to determine if the laboratory met all EPA SW846 method and project QAPP requirements.

A. Case Narrative Review

1. Review the Case Narrative provided with the data package and list all issues of noncompliance or QA/QC exceedances addressed in the case narrative that have not been previously evaluated in the Data Usability Review. For each issue listed, state what qualification to the data has been taken.

Comments:

No further actions

~~IV.~~ V. Review of One Sample

The review of one sample per fraction for each data package was performed to determine if sample results and quantitation limits were correctly calculated and reported.

Sample ID SD-01 was selected for review in this data package (Lab ID 42562-4)

A. Detection / Reporting Limit Review

Reproduce the sample detection limit for one analyte for each method (ICP, GFAA, CVAA, and cyanide). Did the laboratory correctly calculate the detection limits? **Yes / No**. If no, list below the affected analytes.

Lab incorrectly applied "B" qualifiers on some data - corrected in Project database (but not on lab Forms 1 in lab data report).

List in the table below any results that did not meet reporting limits requirements as listed in the Site QAPP, Table 1-7.

Results That Do Not Meet QAPP RL (Sensitivity) Requirements

Analyte	Sample ID # (s) Affected	Highest RL reported (units)	QAPP RL (units)	Reason (% solids; blank action; etc.)
All sediments met project reporting limit requirements.				

B. Sample Result Verification - Sediment

A calculation for one analyte for each method is reproduced below and compared to the result reported by the laboratory. List any discrepancies noted and actions taken. **Sample ID** SD-01

SD-01 % solids = 87.0 (Lab ID 42562-4)

1. ICP Analyte Lead

Laboratory Result 188 mg/Kg Calculated Result 188 mg/Kg dry wt ✓ rounded

Example Calculation:

prep = 2.06 g initial wt → 50 ml final volume

JWC 12/9/99 inst. reading = ~~5843~~ 6738 ug/L Dil. = 10X (already included)

6738 ug/L x 50 ml / 2.06 g x 1/0.87 x 1/1000 (units conversion) = 187.98 mg/Kg

2. GFAA Analyte Arsenic

Laboratory Result 12.2 mg/Kg Calculated Result 12.2 mg/Kg dry wt ✓

Example Calculation:

prep = 2.06 g → 50 ml

inst. reading = 43.7 ug/L (~~includes~~ Dil = 10X) JWC 12/9/99

43.7 ug/L x 10X (Dil. Factor) 50 ml / 2.06 g x 1/0.87 x 1/1000 (units conversion) = 12.19 rounds → 12.2 mg/Kg.

3. Cyanide

Laboratory Result Calculated Result

Example Calculation:

NA

4. Mercury

Laboratory Result 0.31 mg/Kg Calculated Result 0.31 mg/Kg dry wt ✓

Example Calculation:

prep = 0.25 g sediment → 50 ml final volume

inst reading = 1.35 ug/L

1.35 ug/L x 50 ml / 0.25 g x 1/0.87 x 1/1000 (units conversion) = 0.310 mg/Kg

Data Summary Key for Data Usability Checklist Review

J - The associated numerical value is an estimated quantity due to quality control criteria exceedance(s). The value is usable for project decisions as an estimated result.

U - The analyte was analyzed for, but was not detected. The associated numerical value is the sample reporting/quantitation limit. The value is usable for project decisions as a nondetect result at the reporting limit.

UJ - The analyte was analyzed for, but was not detected. The associated numerical value is the sample reporting/quantitation limit and is an estimated quantity. The value is usable for project decisions as a non-detect result at the estimated reporting limit.

R - Reject data due to severe or cumulative exceedance of quality control criteria. The value is unusable (analyte may or may not be present) for project decisions. Re-sampling and reanalysis is necessary for verification.

NA - Not Analyzed

List of Inorganic Data Usability Checklist Review Acronyms

CCB	-	Continuing Calibration Blank
CCV	-	Continuing Calibration Verification Sample
CLP	-	Contract Laboratory Program
CRDL	-	Contract Required Detection Limit
%D	-	Percent Difference
DISS	-	dissolved sample analysis
DQO	-	Data Quality Objective
EPA	-	Environmental Protection Agency
FB	-	Field Blank
FD	-	Field Duplicate
g	-	gram
ICB	-	Initial Calibration Blank
ICP	-	Inductively Coupled Plasma Spectrophotometry
ICS	-	Interference Check Sample
ICV	-	Initial Calibration Verification Sample
Kg	-	kilogram
L	-	liter
LCS	-	Laboratory Control Limit
MD	-	Matrix Duplicate
mg	-	milligram
mg/Kg	-	milligram per kilogram
MS	-	Matrix Spike
NA	-	Not Applicable
ND	-	Non-detect
QA	-	Quality Assurance
QAPP	-	Quality Assurance Project Plan
QC	-	Quality Control
r	-	correlation coefficient of linear regression curve
RB	-	Rinsate Blank (equipment rinsate field blank)
RL	-	Reporting Limit
RPD	-	Relative Percent Difference
SDG	-	Sample Delivery Group
SOW	-	Statement of Work for Inorganic Analysis
TAL	-	Target Analyte List
TOT	-	total sample analysis
µg/Kg	-	micrograms per kilogram
µg/L	-	micrograms per liter

Bibliography

Industri-Plex Trust, 1999. *Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts,* July 1999. Menzie, Cura & Associates, Chelmsford, MA.

USEPA, 1992. *Guidance for Data Useability in Risk Assessment* (Part A), Publication 9285.7-09A.

USEPA, 1994. *Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses,* June 13, 1988, modified February 1989.

USEPA 1996. Region I, EPA-NE *Data Validation Functional Guidelines for Evaluating Environmental Analyses.*

Data Usability Review

Organic Analysis by Modified Method 8270C, 8260B, 8081A, and 8082

EPA Region I Tier III – type review

Client: Menzie-Cura & Associates, Inc.

Site: Industri-Plex, Woburn, Massachusetts

Laboratory: Woods Hole Group Environmental Laboratory, Raynham, MA

SDG: ETRs: 42537, 42541, 42562, and 42563

# of samples/Analyses: 14 sediment samples for Volatiles, Semivolatiles, Pesticides and PCB analyses

Initial Reviewer: Dr. Nancy C. Rothman, New Environmental Horizons, Inc. NCRM

Senior Reviewer: Susan D. Chapnick, New Environmental Horizons, Inc. SDChapnick 12/7/99

Date Completed: October 29, 1999

The Data Usability Review, representing a Region I Tier III-type validation, was performed on the data package. The intentions of this review are: 1) to determine if the data were generated and reported in accordance with SW-846 Methods 8260B, 8270C, 8081A, 8082, the *Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts, July 1999*, Region I, EPA-NE *Data Validation Functional Guidelines for Evaluating Environmental Analyses; Part II. Volatile/Semivolatile Data Validation Functional Guidelines*, 12/96 2), and the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, EPA540/R-94/012, February 1994; 2) to determine if the data met the program data quality objectives for acceptable accuracy, precision, and sensitivity; 3) to determine and define the technical usability of the data based on the accuracy, precision, and sensitivity QA/QC indicators; and 4) to update the project database with appropriate data quality qualifiers.

The Data Usability Review consists of five main sections. Section I is the Overall Summary of Data Usability including subsections addressing technical usability, accuracy, precision, and sensitivity of the data. Section II is the Data Package Completeness Review. Section III is the Review of the Laboratory Data Summary Forms and Additional QA/QC Parameters to determine if the QC requirements met and to determine the affect of exceeded QC requirements on the precision, accuracy, and sensitivity of the data. Section IV is the Review of the Overall Data Package to determine if contractual requirements were met. Section V is Example Sample Calculations to determine if the sample results and reporting limits were correctly calculated and reported by the laboratory.

I. Overall Summary of Data Usability

A. Summary of Technical Usability

All sediment results for Volatile Organics (VOC), Semivolatile Organics (SVOC), Pesticides (Pest) and Polychlorinated Biphenyls (PCBs) included in the laboratory data package reviewed, identified by Woods Hole Group Environmental Laboratory (WHG) as project numbers (ETRs) 42537, 42541, 42562 and 42563 are usable for project objectives. Results have been estimated (J and UJ) or negated (U) for several compounds in these samples due to quality control criteria exceedances. Data users should note the following uncertainties in the estimated results. The estimated results are usable for project objectives. Note that the associated rinsate blanks are included in the surface water data package. Rinsate blank results were acceptable.

B. Technical Issues Affecting Accuracy

Holding times, calibration criteria, surrogate recoveries, laboratory control sample recoveries, matrix spike/matrix spike duplicate recoveries, and other method-specific QC sample results were reviewed to evaluate the accuracy of the sediment results.

Volatile Organic Compound (VOC) Results

The accuracy for VOC for one sediment sample, SD-13, was compromised due to low surrogate recovery. The positive and non-detect results for this sample have been qualified as estimated (J and UJ) and may be biased low.

The accuracy for VOC in two sediment samples, SD-05 and SD-05DUP, was compromised due to high surrogate recoveries. The positive results for these samples have been qualified as estimated (J) and may be biased high.

The accuracy for VOC in one sediment sample, SD-03, was compromised due to low matrix spike (five out of five spikes recovered below criteria) and matrix spike duplicate recoveries (four out of five spikes recovered below criteria). Since the majority of spike compounds were low outside criteria, all positive and non-detect results were qualified as estimated (J and UJ) in the unspiked sample and may be biased low.

All other quality control information, such as holding times, LCS recoveries, and surrogate recoveries, associated with accuracy met QAPP and method criteria for the other VOC results in these sediment samples.

Semivolatile Organic Compound (SVOC) Results

Surrogate recovery in one sediment sample, SD-05DUP, was high, outside criteria for one of the Base/Neutral surrogates (2-fluorobiphenyl). The laboratory speculated that the high recovery may have been a result of a dilution required for analysis of the sample. Since the other surrogates were within criteria, no action was taken to qualify the sample data based on one of the surrogates being recovered outside of criteria.

One sample was analyzed outside of the instrument tune time (33 minutes beyond the 12-hour tune requirement). A secondary dilution of this analysis was required, due to targets over calibration range, which was done within analytical tune time. A comparison of the undiluted run with the dilution run showed good data comparability; therefore, no action was taken to qualify the undiluted sample analysis due to its being analyzed just beyond tune time.

The matrix spike (MS) and matrix spike duplicate (MSD) recoveries for 4-nitrophenol and pyrene did not meet criteria for the spiking analysis of sample SD-03. The 4-nitrophenol in the MS was high outside criteria while the MSD was acceptable. Since the sample did not report a positive result for 4-nitrophenol, no action was taken based on this finding. The MS and MSD recovery results for pyrene were 250% and 0%, respectively. The unspiked sample reported pyrene at a level over twelve times higher than the spiking level for this compound in the MS and MSD; therefore, the erratic recovery results suggest that the spiking level was inappropriate for the matrix tested. All other MS/MSD spikes were recovered within criteria. Based on professional judgement, no action was taken to qualify the unspiked sample result for pyrene based on these findings.

The Laboratory Control Sample (LCS) recovered all analytes, except pentachlorophenol, within criteria. Pentachlorophenol in the LCS was not recovered at all (0% recovery). The laboratory was asked to investigate this result and the findings were confirmed. The MS/MSD showed acceptable recovery of pentachlorophenol and the laboratory indicated that in blank matrices, that the pentachlorophenol can show poor recovery results. The other acidic components spiked into the LCS gave acceptable recovery and none of the sediment samples reported positive results for pentachlorophenol. Since the MS/MSD was acceptable for pentachlorophenol, professional judgment was used to qualify all pentachlorophenol results as estimated (UJ) and potentially biased low based on the LCS result. This action was taken instead of rejecting the non-detected data since there was evidence that the sediment matrices would have recovered the pentachlorophenol had it been present in the field samples.

A freeze-dried aliquot of Organics in Marine Sediments Standard Reference Material (SRM 1941a) was also extracted and analyzed along with the sediments within this SDG. The recovery for all the detected polynuclear aromatic hydrocarbons (PAHs) ranged from 35% to 78%. These results are an indication that the method of freeze-drying, extraction, and analysis used for the sediments was of acceptable accuracy.

All other quality control information, such as holding times and surrogate recoveries, associated with accuracy met QAPP and method criteria for the other SVOC results in these sediment samples.

Pesticide and PCB (Pest/PCB) Results

The matrix spike (MS) and matrix spike duplicate (MSD) reported low recovery of endrin in the MS, low recovery of aldrin in the MSD, and high recovery of 4,4'-DDT in the MSD. The unspiked sample, SD-03, did not report positive results for aldrin or endrin; however, 4,4'-DDT was positively detected in the unspiked matrix. Based on these findings, the results for endrin and aldrin in SD-03 have been qualified as estimated (UJ) and may be biased low. In addition, the positive result for 4,4'-DDT in SD-03 has been qualified as estimated (J) and may be biased high.

A freeze-dried aliquot of Organics in Marine Sediments Standard Reference Material (SRM 1941a) was also extracted and analyzed along with the sediments within this SDG. The recovery of 4,4'-DDE and 4,4'-DDT was acceptable (91% and 101% recovery, respectively). However, the recovery of alpha-chlordane in the SRM was 176%. Based on this high recovery of alpha-chlordane, the positive results reported for this compound in three sediment samples, SD-03, SD-01, and SD-06, were qualified as estimated (J) and may be biased high.

All other quality control information, such as holding times, surrogate recoveries, and LCS recoveries associated with accuracy met QAPP and method criteria for the other Pest/PCB results in these sediment samples.

C. Technical Issues Affecting Precision and Representativeness

The relative percent difference (RPD) between matrix spike and matrix spike duplicate results and between field duplicate pair results were evaluated to assess precision and representativeness of the sediment data.

Volatile Organic Compound (VOC) Results

Precision was acceptable for VOC results based upon evaluation of the matrix spike (MS) and matrix spike duplicate (MSD) spike results. A comparison between the unspiked sample, MS and MSD for comparability of the non-spiked analytes indicated that precision for acetone was acceptable; however, the precision for methyl ethyl ketone did not meet criteria (%RSD = 87%). This comparison, along with low spike recovery results, as discussed in Section B, lead to qualification of all the unspiked sample results in SD-03 as estimated (J and UJ) for VOC. The acceptable precision of the MS/MSD and acetone results however, suggest that the recovery issues observed may be matrix specific.

One field duplicate pair was associated with this SDG: SD-05 and SD-05DUP. The precision between these samples was acceptable for several positive results; however, precision was compromised for cis-1,2-dichloroethene (RPD = 104.2%), trichloroethene (RPD = 75.0%), toluene (RPD = 102.7%); chlorobenzene (RPD=84.6%), ethylbenzene (RPD=86.9%), p/m-xylene (RPD=83.3%), and o-xylene (RPD=50.8%). Results were qualified as estimated (J) for the seven specific compounds listed above in both of the field duplicates due to poor duplicate precision results. This is an indication of sediment sample heterogeneity, which may affect the representativeness of the samples for the VOC results within this SDG.

All of the sediment samples for VOC analysis had percent solids less than 30%. Sample aliquot heterogeneity in samples with percent solids of less than 30% may affect the representativeness of the sample to the site location and is often a cause of poor precision due to sample matrix heterogeneity. The sampling for volatile sediment samples was modified from Method 5035 in an attempt to appropriately deal with sediments with very low solids content (<30%). As such, the low-level preservation technique required sampling approximately 5g of sediment and placing the sample under 5mL of water (method 5035 suggests a 1:2 ratio of soil to water). The medium- or high-level preservation technique also required 1:1 methanol to sample preservation. Therefore, while Region I data validation guidelines require that data be estimated (J) and/or rejected (R) based on low % solids content of the samples, no action was taken to qualify sediment sample results based on solids content for this project (this decision was arrived at through consultation with Andy Beliveau, Region I QA Officer). The percent solids measured in the sediment samples were as follows (percent solids value obtained is reported in parentheses): SD-04 (13.2%); SD-12 (13.8%); SD-13 (27.0%); SD-03 (23.7%); SD-02 (8.8%); SD-01 (23.8%); SD-10 (22.5%); SD-11 (14.7%); SD-05 (11.0%); SD-05DUP (10.0%); SD-09 (7.2%); SD-08 (17.0%); SD-07 (10.3%); and SD-06 (18.4%).

Semivolatile Organic Compound (SVOC)Results

Precision was slightly compromised for SVOC results based upon the matrix spike (MS) and matrix spike duplicate (MSD) results. Precision as measured by the relative percent difference (RPD) was acceptable for all spikes except acenaphthene and pyrene. Acenaphthene MS/MSD reported RPD = 25% compared to QAPP and method criteria of RPD ≤ 19%. Based on this imprecision, the result for acenaphthene in the unspiked sample (SD-03) was qualified as estimated (J). The results for pyrene, as discussed in Section B, were not deemed to be relevant since the level of spiking for this compound was not appropriate for the unspiked matrix. Therefore, even though the RPD for pyrene was 200%, no action was taken to qualify the unspiked sample data based on this result. These results are an indication of variable precision and representativeness of the sediment results in this SDG.

One field duplicate pair was associated with this SDG: SD-05 and SD-05DUP. The precision between these samples was not acceptable for all detected target analytes except for bis(2-ethylhexyl)phthalate (RPD = 19.5%). The RPD for all other detected results ranged from 65% to 102% as compared to the QAPP criteria of RPD ≤ 50%. Based on this imprecision, the results for fluorene, phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene, and carbazole were qualified as estimated (J) in samples SD-05 and SD-05DUP. It should be noted that the percent solids (% solids) results of the freeze-dried sample aliquots were significantly different for these field duplicates: SD-05 % solids = 97.31% and SD-05DUP % solids = 55.07%. The "as received" % solids content of these samples, however, as measured for the volatiles analyses, were comparable (SD-05 = 11.0% and SD-05DUP =

10.0%). Additionally, only 10g of sample SD-05 was available for extraction while SD-05DUP had adequate solids to extract the full 30g aliquot required by the method. The field duplicate comparison, the MS/MSD comparison, and the variability in % solids content suggest that the field duplicate precision may have been compromised due to matrix-related variability, sampling variability, and/or due to freeze-drying and extraction variability which may have affected the SVOC results reported for all of the sediments in this SDG.

The "as received" sediments all had % solids < 30% as discussed in the VOC analysis section. The freeze-drying process removed a significant portion of the water content of these samples such that all freeze-dried % solids were > 40%. The increase in solids content of these samples allowed more solid material to undergo extraction for SVOC thereby increasing the representativeness of the sediment aliquots to the sampling points.

Pesticide/PCB (Pest/PCB) Results

Precision was slightly compromised for the Pest/PCB results based upon the matrix spike (MS) and matrix spike duplicate (MSD) results. The relative percent difference (RPD) for aldrin was 44% (compared to QAPP criteria of RPD ≤ 43%) and for gamma-BHC at 68% (compared to QAPP criteria of ≤ 50%). All other MS/MSD components met QAPP precision objectives. A comparison of the unspiked positively detected results reported for SD-03, the MS and the MSD gave percent relative standard deviations (%RSD) < 50% indicating adequate precision in the measurement of 4,4'-DDE and 4,4'-DDD in is matrix. Based on these MS/MSD results, the unspiked sample, SD-03, was qualified as estimated (UJ) for aldrin and gamma-BHC and are usable as estimated values. The precision of the analytical system appears to have been analyte dependent.

One field duplicate pair was associated with this SDG: SD-05 and SD-05DUP. The Pest/PCB results for both of these samples were all non-detect; therefore, precision from the field through analysis could not be assessed.

The "as received" sediments all had % solids < 30% as discussed in the VOC analysis section. The freeze-drying process removed a significant portion of the water content of these samples such that all freeze-dried % solids were > 40%. The increase in solids content of these samples allowed more solid material to undergo extraction for Pest/PCB thereby increasing the representativeness of the sediment aliquots to the sampling points.

D. Technical Issues Affecting Sensitivity

Blank contamination in method and field blanks, initial and continuing calibrations, and MDLs were reviewed to assess sensitivity of the results compared to QAPP reporting limits..

Volatile Organic Compound (VOC) Results

The QAPP required reporting limit (RL) for all volatile analytes was 2 μg/kg based on a 100% solids content sample. The laboratory's lowest concentration initial calibration standard was 2 μg/L for all components except acetone, methylene chloride, bromomethane, chloroform, carbon tetrachloride and toluene which were at variable concentrations (ranging from 2-10 μg/L) depending on the initial calibration performed (three initial calibrations were associated with the sediment results). The reporting limits for the analytes listed above were raised, as appropriate, to the sample-specific reporting limit equivalent to the concentration of the lowest initial calibration standard employed. In addition, the sample-specific reporting limits were all elevated due to the low solids content of the sediment samples as discussed in Section C. For all samples and all analytes, the increase in reporting limits still met the Ecological and Human Health Risk Based Criteria (RBC) with the exception of vinyl chloride in SD-02 (RL = 25 μg/kg) and SD-09 (RL = 24 μg/kg) which still met the Ecological RBC but was slightly above the Human Health RBC (RBC = 21 μg/kg).

The method 8260B and Region I criteria for initial calibration of percent relative standard deviation (%RSD) ≤ 30% was not met for bromomethane and methylene chloride (%RSD = 38.2% and 30.8%, respectively) for the initial calibration associated with the analysis of the Trip Blank. The cause of the non-linearity for each of these compounds was investigated and it was shown that for bromomethane, elimination of the highest point calibration standard returned the %RSD to within criteria. For methylene chloride, elimination of the lowest level calibration standard returned the %RSD to within criteria. Based on EPA Region I validation guidelines, since all results for bromomethane were non-detects, no action was taken to qualify the non-detected data since accuracy at the RL was established. For methylene chloride however, the Trip Blank result was qualified as estimated (UJ) due to uncertainty in quantitation at the sample-specific reporting limit. This estimated result is usable.

The method 8260B and Region I criteria for initial calibration of percent relative standard deviation (%RSD) ≤ 30% was not met for acetone and methylene chloride (%RSD = 48.8% and 55.5%, respectively) for the initial calibration associated with the analysis of the sample SD-04. The cause of the non-linearity for each of these compounds was investigated and it was shown that elimination of neither the highest nor lowest point calibration standard returned the %RSD to within criteria. Based on this finding, the results for acetone and methylene chloride in sample SD-04 were qualified as estimated (J and UJ). These estimated data are usable for project objectives.

The method 8260B and Region I criteria for initial calibration of percent relative standard deviation (%RSD) ≤ 30% was not met for acetone and methylene chloride (%RSD = 33.0% and 71%, respectively) for the initial calibration associated with the samples SD-02, SD-01, SD-10, SD-11, SD-05 SD-05DUP, SD-09, SD-08, SD-07, and SD-06. The laboratory used regression analysis on the methylene chloride which resulted in a linear formula with a regression coefficient (r^2) = 1.000; therefore, no action was required for methylene chloride results. The cause of the non-linearity for acetone was investigated and it was shown that elimination of the lowest point calibration standard returned the %RSD to within criteria. Therefore, results reported between 10 µg/L and 200 µg/L, on a sample-specific basis, were considered usable without qualification (i.e., accepted as reported). Samples SD-02, SD-01, SD-10, SD-11, SD-05 SD-05DUP, SD-09, SD-08, and SD-07 all reported the presence of acetone within the accurate range of the initial calibration so no action was taken to qualify these data. Sample SD-06 however, reported acetone below the acceptable region of accurate quantitation; therefore, the acetone result in this sample was qualified as estimated (J). This estimated result is usable.

The method 8260B criteria for calibration verification of percent difference (%D) $\leq \pm$ 25% was not achieved for several compounds in several continuing calibrations (see page 5-, 5A-, and 5B-VOA). Several non-detected results for bromomethane, chloromethane, vinyl chloride, methylene chloride, and acetone in ten sediment samples and the Trip Blank were qualified as estimated (UJ) due to exceedances of the %D in the continuing calibrations. These estimated non-detected results are usable.

The aqueous Trip Blank 6/17 contained trace-level acetone at 4 µg/L and chloroform at 1 µg/L. Several matrix-matched method blanks also reported chloroform; therefore, no action was taken to qualify the chloroform sample data based on the Trip Blank results. However, thirteen of the fourteen sediment samples did report positive results for acetone. Since this trip blank was not matrix-matched to the samples, all positive results for acetone were qualified "TB" to indicate that the Trip Blank also reported acetone as directed by Region I data validation guidelines. It should be noted that: 1) due to sampling error, only one Trip Blank was taken during the sampling of these sediments and that discrete Trip Blanks for the sampling done on June 18 through June 23, 1999 did not exist; and 2) the acetone results for nine of the sediments were quite high (> 5 x RL) and that the presence of acetone in these samples is probably not related to cross-contamination during sampling or due to sampling error.

The seven matrix-matched Method Blanks all reported trace level contamination for methylene chloride and/or chloroform. Blank action to negate sample-specific trace level methylene chloride and/or chloroform was taken for samples SD-03, SD-12, SD-13, SD-04, SD-05 and SD-05DUP (see pages 6-, 6A-, and 6B-VOA). In these samples, the level of methylene chloride and/or chloroform was raised to the sample-specific reporting limit and the result negated (U). These negated levels still meet the Ecological Risk Based Criteria for methylene chloride and chloroform and are usable.

The Internal Standard (IS) chlorobenzene-d_5, was recovered in sample SD-06 below criteria. The IS should be –50% to +100% of the IS response found in the continuing calibration; however, for this sample, the IS was –52.2% compared to the associated continuing calibration. The analytes associated with quantitation using this IS are chlorobenzene, ethylbenzene, xylenes, styrene, bromoform and 1,1,2,2-tetrachloroethane. None of these compounds were positively detected in sample SD-06. Based on this non-compliant IS response, the non-detected results for the compounds listed above have been qualified as estimated (UJ) due to the apparent loss in sensitivity of the instrument during analysis of SD-06 to this region of the chromatogram. These estimated results are usable for project objectives.

The last Internal Standard, 1,4-dichlorobenzene-d_4, was recovered low outside criteria in five samples; however, since this IS is not used for quantitation of the analytes of interest, no action was taken to qualify the sample data based on this finding.

All other VOC results met sensitivity requirements as stated in the QAPP project-specific reporting limits.

Semivolatile Organic Compound (SVOC) Results

The sediment samples received from the field all contained % solids < 30% (see Section C, VOC Results). To improve the solids content of these sediments, all samples underwent freeze-drying prior to extraction and analysis. The increase in % solids content was substantial for these samples (e.g., in SD-02, % solids increased from 8.8% as received to 92.3% after freeze-drying). This process of freeze-drying allowed more solids in the sediments to undergo extraction (improved extraction efficiency and sample representativeness) while also decreasing the reporting limits (increasing sensitivity) for analysis as compared to those limits that would have been reported if freeze-drying were not implemented.

The QAPP required reporting limit (RL) for all semivolatile analytes ranged from 170 to 420 μg/kg assuming 100% solids content in the samples. The lowest concentration initial calibration standard used by the laboratory was 2 μg/mL or 5 μg/mL, depending on the analyte. Due to limited sample size, the extraction for SVOC and Pest/PCBs was performed together and the resultant extract split between the SVOC and Pest/PCB fractions prior to cleanup and analysis. The overall extraction scheme was equivalent to 30-g sediment extracted to a final volume of 4 mL for SVOC. Using this extraction strategy, the lowest concentration calibration standard used was equivalent to a reporting limit of 270 to 670 μg/kg, on a sample-specific basis assuming 100% solids content in the sample. Increases in these reporting limits were observed due to the actual % solids content of the samples and if smaller sample sizes than 30g were used during extraction (e.g., samples SD-05 and SD-02 used 10.1g and 8.36g, respectively, during extraction due to limited availability of sample). The lowest Ecological and Human Health Risk Based Criteria (RBCs) are those associated with the polynuclear aromatic hydrocarbons (PAHs). In all samples, except SD-02, positive detects were reported for most, if not all, of the PAHs; therefore, increase in reporting limit will not affect the risk assessments. For sample SD-02, all target analytes were non-detect; however, due to the smaller than normal sample size during extraction, the reporting limits have been increased above the Ecological and Human Health RBCs.

The QAPP RL for hexachlorocyclopentadiene was 170 μg/kg; however, the lowest concentration initial calibration standard for this compound was at 5 μg/mL which corresponds to a sample-specific RL of 270 μg/kg. This compound was not detected in any sample. The laboratory incorrectly reported this compound using the 170 μg/kg RL; therefore, in all samples, the reporting limit for hexachlorocyclopentadiene was raised to the actual sample-specific limit achievable based on the lowest initial calibration standard at 5 μg/mL. Conversely, the laboratory reported all data for 3-nitroaniline assuming a lowest initial calibration standard of 5 μg/mL; however, the initial calibration showed that this analyte was present in the 2 μg/mL calibration standard and that acceptable linearity across the initial calibration was achieved using this lowest standard. Therefore, the RL for 3-nitroaniline was lowered to the sample-specific level equivalent to the 2 μg/mL standard and is consistent with the RL requested in the QAPP. These amended reporting limits still meet the Ecological Risk Based Criteria and are usable.

Samples SD-03, SD-11, SD-07, and SD-06 were analyzed initially without dilution of the extracts and some of the target analytes were reported at concentrations above the linear calibration region for the instrument. Dilution analyses were performed on these samples and were identified by the lab by appending an "E" suffix to the sample name. During assessment, a comparison of the undiluted analysis was made to the dilution analysis and in all cases the data were comparable. Therefore, for samples SD-03, SD-11, SD-07, and SD-06, all data reported in the electronic database is that associated with the undiluted analysis except for those analytes which were over range, in which case the dilution result has been reported for the specific analyte (i.e., the lowest possible non-detect reporting limit has been associated with these samples).

The method 8270C and Region 1 criteria for initial calibration of percent relative standard deviation (%RSD) ≤ 30% was not met for hexachlorocyclopentadiene (%RSD = 33.0%), 2,4-dinitrophenol (%RSD = 72.2%), and 4,6-dintro-2-methylphenol (%RSD = 36.1%). These three compounds were not detected in any of the samples. For all three compounds, the lowest calibration standard response was the primary source for non-linearity, therefore, for all samples, the non-detected results for these compounds were qualified as estimated (UJ) due to uncertainty in quantitation near the RL. The estimated results are usable.

The method 8270C criteria for calibration verification of percent difference (%D) ≤ ± 25% was not achieved for hexachlorocyclopentadiene, 4-nitrophenol, bis(2-chloroisopropyl)ether and N-nitroso-di-n-propylamine (see page 5-SVOC). None of these compounds were positively detected in any of the samples. All samples were analyzed following this calibration; therefore, the non-detected sediment sample results for these compounds were qualified as estimated (UJ). The estimated results are usable.

The method 8270C criteria for calibration verification of percent difference (%D) ≤ ± 25% was not achieved for six compounds in one other continuing calibration. This calibration was associated with the dilution analyses for samples that had analytes over calibration range in their undiluted runs. Since none of the compounds for which the %D was outside of criteria were used in reporting data, no action was taken based on this finding.

Pesticide/PCB (Pest/PCB) Results

The QAPP required RL for all Pesticides, except methoxychlor, were 1.0 μg/kg assuming a 100% solids sample. The required reporting limits for methoxychlor and the PCBs, as aroclors, were 5.0 and 10 μg/kg, respectively. The actual sample-specific reporting limits for SD-02 and SD-05 were elevated above these QAPP reporting limits due to limited sample size for use in extraction. Samples SD-05DUP, SD-09, and SD-07 reported elevated sample-specific reporting limits due to low % solids content of the samples. Finally, sample SD-06 reporting limits were elevated above the QAPP required limits since the sample required analysis at a dilution (1-to-10) for analysis to ensure detection of analytes within the calibration range of the instrument.

The method 8081A/8082 criteria for calibration verification of percent difference (%D) or percent Drift (%Drift) ≤ ± 15% were not achieved for several compounds in several continuing calibrations (see pages 7-, 8-, 9-, and 9A-Pest/PCB). In addition, the laboratory convention for calculation of %Drift used a formula given in Method 8000B which reversed the numerator for the calculation (Method 8000B %Drift = (Found – True)/True as compared to standard convention of (True – Found)/True); therefore, all %Drift results cited in this report used the laboratory's convention for the calculation. Several of the non-compliant continuing calibrations were ending sequence standards; therefore, no action was taken to qualify the samples analyzed prior to these standards. Only one opening sequence standard, associated with the analysis of SD-06, was non-compliant on both instrument columns/channels for methoxychlor. As a result of this non-compliance, the non-detected result for methoxychlor reported for SD-06 was qualified as estimated (UJ). This estimated non-detect result is usable.

Samples SD-03 and SD-01 were analyzed initially without dilution of the extracts and some of the target analytes were reported at concentrations above the linear calibration region for the instrument. Dilution analyses were performed on these samples and were identified by the lab by appending an "E" suffix to the sample name. For sample SD-01, all data reported in the electronic database is that associated with the undiluted analysis except for those analytes which were over range, in which case the dilution result has been reported for the specific analyte (i.e., the lowest possible non-detect reporting limit has been associated with these samples). For sample SD-03, the dilution analysis also reported detection of alpha-chlordane, which was not able to be detected in the undiluted analysis due to matrix interference. Therefore, for sample SD-03, the dilution analysis was used to report the alpha-chlordane result and any results for analytes that were over range on the initial analysis. All other results in the electronic database are those associated with the undiluted analysis for sample SD-03.

E. Additional Technical and QA/QC Issues

A review of method compliance, an evaluation of method modifications, and other QA/QC issues were made to evaluate the comparability of the data generated for the project uses.

Volatile Organic Compound (VOC) Results

The Form 5s, showing BFB Tune summary criteria, erroneously show the latest CLP SOW criteria for tune acceptance. The raw data from the GC/MS system accurately has the 8260B criteria and all tunes did meet these criteria. This is a reporting form error that the laboratory is aware of but can not fix using the software they currently employ.

The laboratory used the surrogate 1,2-dichloroethane-d_4 in place of the QAPP suggested surrogate dibromofluoromethane (two other surrogates were the same as suggested in the QAPP). In addition, the laboratory acceptance criteria for surrogate and MS/MSD recoveries were based on laboratory control charted limits as required by Method 8260B. These laboratory limits were in most cases tighter than those given in the QAPP and in all cases, were technically acceptable compared to the QAPP criteria.

The low-level analysis of samples SD-05 and SD-05DUP reported results for acetone that were above the calibration range of the instrument. Since dilution analysis using low-level Method 5035 sample preservation is not possible, the laboratory analyzed the high-level methanol extract of samples SD-05 and SD-05DUP. In these high-level analyses, the reported values for acetone were considerably different from the low-level analyses (~10-20 times higher in the high-level analyses as compared to the low-level analyses). Since there was no methanol Trip Blank associated with these high-level samples to determine if the elevated acetone was sampling related and since the low-level acetone results were reported < 40% above the highest level calibration standard, professional judgment was used to accept the low-level acetone results with qualification as being estimates (J) due to quantitation above the calibration range of the instrument.

The low-level analysis of samples SD-05 and SD-05DUP reported results for benzene that were considerably above the calibration range of the instrument (> 500% higher than highest calibration standard). Since dilution analysis using low-level Method 5035 sample preservation is not possible, the laboratory analyzed the high-level methanol extract of samples SD-05 and SD-05DUP. A comparison of the data between the high-level analyses and the low-level analyses indicate that the benzene results were comparable. The laboratory reported the results of the high-level analyses based upon the amount of methanol used for preservation and did not account for the amount of water from the sample that may also be acting to dilute the sample during analysis (the laboratory properly reported the data as they are required, not accounting for the sample moisture content in their calculations). During this assessment however, the benzene results were recalculated, as suggested by the Massachusetts Department of Environmental Protection and Andy Beliveau (Region I QA Officer) to factor in the sample water content. The laboratory reported values for benzene in the high-level SD-05 and SD-05DUP were 27,000 and 29,000 μg/kg, respectively. Using the percent moisture content of these samples (see Section C), the benzene results were recalculated for SD-05 and SD-05DUP as 43,000 and 48,000 μg/kg, respectively. These recalculated values for benzene were associated in the database with samples SD-05 and SD-05DUP. All other results for VOCs for these samples were reported from the low-level analyses.

Semivolatile Organic Compound (SVOC) Results

For semivolatile analysis, the laboratory spiked only the Base/Neutral surrogates into the samples prior to extraction. This was done because limited sample size required that the semivolatiles, pesticides and PCBs be extracted together and addition of the Acid surrogates would interfere with pesticide analysis. Andy Beliveau, Region 1 QA Officer, was contacted about this spiking protocol and it was decided that action would be taken for the acidic semivolatile compounds if and only if the other QC elements, such as LCS and MS/MSD, showed poor acid compound recovery.

The Form 5s, showing DFTPP Tune summary criteria, erroneously show the latest CLP SOW criteria for tune acceptance. The raw data from the GC/MS system accurately has the 8270C criteria and all tunes did meet these criteria. This is a reporting form error that the laboratory is aware of but can not be fix using the software they currently employ.

Pesticide/PCB (Pest/PCB) Results

For Pesticide/PCB analysis, the laboratory used second-order curve statistics to develop the initial calibrations. An initial evaluation of the Pesticide calibrations showed that the laboratory had erroneously forced the curves through the origin during their curve statistics processing. The origin was not used in the PCB initial calibration curve processing. The laboratory was contacted on September 24, 1999 (Resubmittal issued) and they were asked to reprocess all initial calibrations without using the origin as a calibration point, to reprocess all continuing calibrations, and to reprocess any sample data which may have been affected by a change in calibration (e.g., no sample data required reprocessing since all results were non-detects; however, laboratory control spikes (LCS) and MS/MSD did require reprocessing). On October 11, 1999, reprocessed data were received for Pesticides and these data were inserted in the data package (the original data are included in the project files for documentation only). Note that this regeneration process resulted in different continuing calibration results in some cases. NEH initiated a corrective action and the laboratory has changed their Pesticides calibration to ensure that all future work does not force the calibration curves through the origin.

The pesticide and PCB analyses were performed on the same extract using a single long analysis run time to allow the determination of the pesticides and PCBs without interference. As such, the MS/MSD performed was done using only pesticide spikes – no PCB MS/MSD was performed. In addition, the laboratory used laboratory generated recovery acceptance criteria for the MS/MSD (and LCS) which were actually tighter than those given in the QAPP. Therefore, the laboratory limits for MS/MSD were considered acceptable for project objectives.

The precision acceptance criteria for the MS/MSD (RPD) were set by the laboratory at 50% on their report forms. This is greater than the acceptable RPD for precision defined in the Site QAPP for several analytes (criteria ranged from 31% to 50% for different pesticide MS compounds). The laboratory was contacted and it was determined that the 50% level was an arbitrary precision value (not based on control charting); therefore, precision objectives during this assessment were judged versus those given in the QAPP and not based on the laboratory-reported precision criteria.

During assessment, a check of raw data to final reported data and to electronic data was made which uncovered two reporting errors. Resubmittals were issued to the laboratory to investigate the issues and to re-report the data properly. On October 28, 1999, the laboratory resubmitted corrected results pages for samples SD-01E and SD-02, which have been inserted into the data package. NEH initiated a corrective action requiring the laboratory in the future to submit their Pesticides worksheets along with the sample data sheets to ensure that correct transposition from the worksheet to the final data sheet is made.

The laboratory qualified data using a "P" or "I" qualifier to indicate that the results from the two channels (columns) differed by more than 40% RPD. The "P" qualifier indicated that the higher of the two values detected was chosen for final reporting of results. The "I" qualifier indicated that the lower of the two values detected was chosen for final reporting of results since interference on the non-chosen channel existed causing the high RPD. An evaluation of the laboratory qualified "P" and "I" data was made during assessment and all "I" data were accepted and the results reported in the electronic database without qualification (i.e., the final data usability qualification of results removed the "I" qualifier). For all samples, except SD-06, any data reported with the "P" qualifier were also accepted without qualification since the RPDs were <50% (technical judgment limit based upon QAPP precision criteria). However, for sample SD-06, the RPDs for gamma-chlordane and 4,4'-DDD were 51% and 55%, respectively; therefore, the results for these two compounds in sample SD-06 were qualified as estimated (J) and may be biased high.

F. Summary of Completeness, Documentation, and Chain-of-Custody Issues

Chain-of-custody (COC) documentation of temperature on receipt at the laboratory was missing for several COCs. For samples received 6/21/99, a receipt temperature of 7°C was recorded. This exceeds the criterion of 4 $\pm$ 2 °C. The samples were collected in the summer and immediately sent via courier to the laboratory. Only surface water samples were collected associated with this COC. It appears that they did not have a chance to cool-down completely by the time they were received at the laboratory. No action was taken other than to note this discrepancy.

Due to a sampling miscommunication, a Trip Blank for volatiles analysis associated with the sediments was not taken on each day of sampling. A water Trip Blank accompanied the first shipment of samples to the laboratory (called Trip Blank 6/17). No Trip Blanks were received with the sediment sampling events on June 18 through June 23, 1999. The one Trip Blank received was associated with all of the sediments within this project.

Indication of "sediment" or "surface water" for the association of the five rinsate blanks was not made on the chain-of-custodies. However, personal communication with the sampler, Peter Kane of Woods Hole Group Environmental Laboratory, confirmed that the rinsate blanks were taken as rinses of the Eckman grab samplers used for sediment collection.

Times of sampling were not recorded on the chain-of-custody's for the sampling done on June 21 through June 23, 1999.

The sampling date information was incorrect in the excel database file of results (generated by the laboratory) for several samples. The corrected information was added to the sample results, as well as the % solids content of the samples analyzed, during this assessment. The project data file was made complete and compliant with these corrections.

The laboratory reported results for several analytes at a level below their reporting limit and qualified the data as estimated (J) due to uncertainty in quantitation. During this Data Usability Review, the "J" qualifier on data of this type was accepted, unless otherwise negated by actions taken during assessment, and was associated with the final results (i.e., the "J" was carried forward to the final data usability qualification of results).

NEH generated a data summary table based on the project data file supplied by the laboratory including the corrections and qualifications added to the data based on this Data Usability Review. The data summary table of technically valid and usable results for sediments reviewed by NEH is attached to this report.

Industri-Plex 1999

Organic Data Usability Review
Sediments

II. Data Package Completeness

The data package is reviewed for completeness using the Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts, July 1999.

1. Were all required reporting forms and associated raw data included in the data package? **Yes / No**. If no, contact laboratory for resubmittals and attach copy of resubmittal request to this checklist.

2. Was the data accompanied by a Data Review Checklist / Project Narrative explaining any non-compliance issues with the analyses? **Yes / No**. Was the narrative complete? **Yes / No.**

3. Were all samples listed in the laboratory data review checklists included in the data package? **Yes / No.** Were all sample analyses requested on the Traffic report and Chain-of-Custody performed by the laboratory? **Yes / No.** Were there any Chain-of-custody deviations noted? (e.g., labeling discrepancy between sample jar and COC, temperature outside of requirements, etc.) **Yes / No.** - See below

Comments:

- Sampling performed 6/18 → 6/23 Did not take a Trip Blank for VOA.
- Sampling performed 6/21 → 6/23 Did not record time of Sampling
- All Coolers received between 3°C and 5°C -
- Initial evaluation of Pesticide data indicated that laboratory had incorrectly performed Initial Calibration Curve processing. A Resubmittal request, 9/24/99, was issued to reprocess all standards + samples - Reprocessed data for Pesticides received 10/11/99 and inserted into data pages (See page 3A)
- Resubmittals issued (see pages 3B + 3C) to lab to re-report samples SD-01E and SD-02. Lab responded on 10/28/99 with new form 1s which were added to the data package.

34 Pheasant Run Drive, Skillman, NJ 08558
63 College Avenue, Arlington, MA 02474
Phone: (908) 874-5686 ◊ (781) 643-4294 ◊ Fax: (908) 874-4786
Email: NCR@ix.netcom.com ◊ Chapnick@world.std.com

New Environmental Horizons, Inc.

Fax

To:	Heldar Costa, WHG	**From:**	Nancy C. Rothman, Ph.D.
Fax:	508-822-3288	**Pages:**	1
Phone:	508-822-9300	**Date:**	September 24, 1999
Re:	**Resubmittal Request**	**CC:**	Susan D. Chapnick
	Industri-Plex Data		
	Organics		

√ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

This Resubmittal Request is to document and confirm my telephone conversation today with Pete Kane regarding the issue below.

Pesticide Calibration data

In performing my review of the Pesticide's work on Industri-Plex, I saw that the initial calibrations for the Pesticides used calibration curve statistics for verifying the initial calibration and for performing quantitation of the Pesticides. All of the compounds reviewed used curves (i.e., not average Calibration Factors) and all indicate that the curve statistics were derived by FORCING THE CURVE THROUGH THE ORIGIN. This is unacceptable – the curves may NEVER be forced through the origin for a valid calibration. I reviewed the electronic files you sent on Industri-Plex and see that for several samples across all of the data submitted, that Pesticides were detected. These data need to be reprocessed using the correct calibration technique, re-quantitated, and re-reported. Please ensure that all of your staff (GC and GC/MS) know that curves may NOT be forced through the origin if used. I did a cursory check on the VOA and SVOC data and think that average RRFs were used here; however, expect a resubmittal request for these analyses if I do see any curve data.

Thank you for your prompt response to this resubmittal. Please forward your response to:

Nancy C. Rothman
NEH, Inc.
34 Pheasant Run Drive
Skillman, NJ 08558
phone: 908-874-5686
fax: 908-874-4786

34 Pheasant Run Drive, Skillman, NJ 08558
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Phone: (908) 874-5686 ◊ (781) 643-4294 ◊ Fax: (908) 874-4786
Email: NCR@ix.netcom.com ◊ Chapnick@world.std.com

New Environmental Horizons, Inc.

Fax

To:	Heldar Costa, WHG	**From:**	Nancy C. Rothman, Ph.D.
Fax:	508-822-3288	**Pages:**	**1**
Phone:	508-822-9300	**Date:**	October 22, 1999
Re:	**Resubmittal Request**	**CC:**	Susan D. Chapnick
	Industri-Plex Data		
	Organics		

√ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

Sediment Sample 42562-4 and 42562-4E Pesticides

In performing the review of the data, I see that the original sample run, 42562-4 reports that 4,4'-DDE is over calibration range (flagged E). The dilution analysis, 42562-4E, chromatograms (Channel A and B) appear to call 4,4'-DDE; however, the datasheet indicates that 4,4'-DDE is not detected at 19U. I believe that this is in error. Instead, I think the 4,4'-DDE should have been reported at 470 ug/kg. Please review this data. If you are in agreement with my evaluation, please revise the datasheet for this sample to report 4,4'-DDE properly.

Thank you for your prompt response to this resubmittal. Please forward your response to:

Nancy C. Rothman
NEH, Inc.
34 Pheasant Run Drive
Skillman, NJ 08558
phone: 908-874-5686
fax: 908-874-4786

34 Pheasant Run Drive, Skillman, NJ 08558
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Email: NCR@ix.netcom.com ◊ Chapnick@world.std.com

New Environmental Horizons, Inc.

Fax

To:	Heldar Costa, WHG	**From:**	Nancy C. Rothman, Ph.D.
Fax:	508-822-3288	**Pages:**	**1**
Phone:	508-822-9300	**Date:**	October 25, 1999
Re:	**Resubmittal Request**	**CC:**	Susan D. Chapnick
	Industri-Plex Data		
	Organics		

√ Urgent ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

Sediment Sample 42562-1 Pesticides

In performing the review of the data, I see that the original sample before reprocessing reported 4,4'-DDD at 26 ug/kg (this is also what was reported on the electronic file). The reprocessed data reports 4,4'-DDD at 13 ug/kg; however, the worksheet indicates that the result should really have been reported at 25 ug/kg. Please review the reprocessed data (pages R944 and R945) and if I am correct, please submit an amended Form 1 for this sample with the correct result for 4,4'-DDD.

Thank you for your prompt response to this resubmittal. Please forward your response to:

Nancy C. Rothman
NEH, Inc.
34 Pheasant Run Drive
Skillman, NJ 08558
phone: 908-874-5686
fax: 908-874-4786

[illegible] 2C

Data Summary Key for Data Usability Checklist Review

J - The associated numerical value is an estimated quantity due to quality control criteria exceedance(s). The value is usable for project decisions as an estimated result.

U - The compound was analyzed for, but was not detected. The associated numerical value is the sample detection/quantitation limit. The value is usable for project decisions as a nondetect result at the reported detection/quantitation limit.

UJ - The compound was analyzed for, but was not detected. The associated numerical value is the sample detection/quantitation limit and is an estimated quantity. The value is usable for project decisions as a nondetect result at the estimated detection/quantitation limit.

R - Reject data due to severe or cumulative exceedance of quality control criteria. The value is unusable (compound may or may not be present) for project decisions. Resampling and reanalysis is necessary for verification.

TB The compound was detected in a Trip Blank

EB - The compound was detected in an Equipment Blank.

BB - The compound was detected in a Bottle Blank.

NA - Not Analyzed

Validation Checklist Review Acronyms

BB	-	Bottle Blank
CCAL	-	Continuing Calibration
CLP	-	Contract Laboratory Program
%D	-	Percent Difference = (A – B)/A x 100)
%Drift	-	Percent Drift = Percent Recovery = ((True-Found)/True X 100)
DQO	-	Data Quality Objective
EB	-	Equipment Blank (Rinsate)
EPA	-	Environmental Protection Agency
FB	-	field blank
g	-	gram
GC/MS -		Gas Chromatography/Mass Spectrometry
ICAL	-	Initial Calibration
Kg	-	kilogram
L	-	liter
LCS	-	Laboratory Control Sample
MDL		Method Detection Limit
MS	-	Matrix Spike
MSD	-	Matrix Spike Duplicate
mg	-	milligram
NA	-	not applicable
ND	-	non-detect
QA	-	Quality Assurance
QC	-	Quality Control
RL		Reporting Limit
RPD	-	Relative Percent Difference ([(| A-B |)/ ½ (A + B)] X 100)
%RSD	-	Percent Relative Standard Deviation (SD/Average Value X 100)
SRM	-	Standard Reference Material
SVOC	-	Semivolatile Organic Compound
TCL	-	Target Compound List
TIC	-	Tentatively Identified Compounds
µg/Kg	-	micrograms per kilogram
µg/L	-	micrograms per liter

Bibliography

Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts, July 1999.

Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses; Part II. Volatile/Semivolatile Data Validation Functional Guidelines, 12/96.

Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Updates II and III (USEPA, Office of Solid Waste and Emergency Response, Washington, DC, September 1995 and December 1996). Methods 8260B, 8270C, 8081A, and 8082.

USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA540/R-94/012, February 1994.

Industri-Plex, Y urn, MA
Site Locations - Orgá. Sediment Data

Sample Location ID:	SD-13			SD-11			SD-10			SD-09			SD-08		
Lab_ID:	42537-7			42562-9			42562-7			42563-6			42563-8		
Date Sampled:	06/17/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
"As-Received" Sediment %solids:	27.0%			14.7%			22.5%			7.2%			17.0%		
Analyte-Volatile Organic Compounds (VOC)															
EPA Method 5035 (modified) and 8260B															
Chloromethane	6	U	UJ	14	U	U	10	U	U	24	U	UJ	19	U	UJ
Vinyl chloride	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Bromomethane	31	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Chloroethane	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Acetone	290		JTB	230		TB	58		TB	470		TB	1400		TB
1,1-Dichloroethene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Carbon disulfide	6	U	UJ	14	U	U	10	U	U	24	U	U	13	J	J
Methylene chloride	15	JB	UJ	34	U	U	24	U	U	59	U	U	47	U	U
trans-1,2-Dichloroethene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
1,1-Dichloroethane	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
2-Butanone (MEK)	89		J	14	U	U	10	U	U	24	U	U	340		
cis-1,2-Dichloroethene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Chloroform	15	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
1,1,1-Trichloroethane	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Carbon tetrachloride	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Benzene	6	U	UJ	14	U	U	10	U	U	41			9	J	J
1,2-Dichloroethane	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Trichloroethene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
1,2-Dichloropropane	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Bromodichloromethane	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Methyl isobutyl ketone (MIBK)	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
cis-1,3-Dichloropropene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Toluene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
trans-1,3-Dichloropropene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
1,1,2-Trichloroethane	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
2-Hexanone	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Tetrachloroethene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Dibromochloromethane	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Chlorobenzene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Ethylbenzene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
p/m-Xylene	12	U	UJ	27	U	U	19	U	U	47	U	U	37	U	U
o-Xylene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Styrene	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
Bromoform	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U
1,1,2,2-Tetrachloroethane	6	U	UJ	14	U	U	10	U	U	24	U	U	19	U	U

U-Result was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. TB/B-Compound was detected in trip/method blank.

Industri-Plex, Woburn, MA
Site Locations - Organic Sediment Data

Validated 12/07/99
NEH, Inc.

Sample Location ID:	SD-07			SD-06		
Lab_ID:	42563-11			42563-13		
Date Sampled:	06/23/99	Lab	DV	06/23/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
"As-Received" Sediment %solids:	10.3%			18.4%		
Analyte-Volatile Organic Compounds (VOC)						
EPA Method 5035 (modified) and 8260B						
Chloromethane	17	U	UJ	6	U	UJ
Vinyl chloride	17	U	UJ	6	U	UJ
Bromomethane	17	U	UJ	6	U	UJ
Chloroethane	17	U	U	6	U	U
Acetone	150		TB	31		JTB
1,1-Dichloroethene	17	U	U	6	U	U
Carbon disulfide	20			17		
Methylene chloride	44	U	UJ	16	U	UJ
trans-1,2-Dichloroethene	17	U	U	6	U	U
1,1-Dichloroethane	45			27		
2-Butanone (MEK)	17	U	U	6	U	U
cis-1,2-Dichloroethene	10	J	J	18		
Chloroform	17	U	U	6	U	U
1,1,1-Trichloroethane	17	U	U	6	U	U
Carbon tetrachloride	17	U	U	6	U	U
Benzene	9	J	J	6	U	U
1,2-Dichloroethane	17	U	U	6	U	U
Trichloroethene	17	U	U	11		
1,2-Dichloropropane	17	U	U	6	U	U
Bromodichloromethane	17	U	U	6	U	U
Methyl isobutyl ketone (MIBK)	17	U	U	6	U	U
cis-1,3-Dichloropropene	17	U	U	6	U	U
Toluene	17	U	U	6	U	U
trans-1,3-Dichloropropene	17	U	U	6	U	U
1,1,2-Trichloroethane	17	U	U	6	U	U
2-Hexanone	17	U	U	6	U	U
Tetrachloroethene	17	U	U	6	U	U
Dibromochloromethane	17	U	U	6	U	U
Chlorobenzene	17	U	U	6	U	UJ
Ethylbenzene	17	U	U	6	U	UJ
p/m-Xylene	35	U	U	13	U	UJ
o-Xylene	17	U	U	6	U	UJ
Styrene	17	U	U	6	U	UJ
Bromoform	17	U	U	6	U	UJ
1,1,2,2-Tetrachloroethane	17	U	U	6	U	UJ

U-Result wa -detected. Associated value is sample-specific reporting limit. J-Result was esti due to quality control exceedance. TB/B-Compound was detected in trip/method

Industri-Plex, Woburn, MA
Reference Locations - Organic Sediment Data

Validated 12 99
NE. Inc.

Sample Location ID:	SD-01			SD-02			SD-03			SD-04			SD-12		
Lab_ID:	42562-5			42562-2			42541-2			42537-2			42537-5		
Date Sampled:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/18/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
"As Received" Percent solid (%):	23.8%			8.8%			23.7%			13.2%			13.8%		
Analyte-Volatile Organic Compounds (VOC)															
EPA Method 5035 (modified) and 8260B															
Chloromethane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	UJ
Vinyl chloride	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Bromomethane	10	U	U	25	U	U	36	U	UJ	13	U	UJ	84	U	UJ
Chloroethane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Acetone	120		TB	2200		TB	210		JTB	34	U	UJ	670		TB
1,1-Dichloroethene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Carbon disulfide	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Methylene chloride	24	U	U	63	U	U	7	JB	UJ	34	JB	UJ	42	JB	U
trans-1,2-Dichloroethene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
1,1-Dichloroethane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
2-Butanone (MEK)	10	U	U	680			60		J	13	U	U	230		
cis-1,2-Dichloroethene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Chloroform	10	U	U	25	U	U	18	U	UJ	34	JB	U	42	U	U
1,1,1-Trichloroethane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Carbon tetrachloride	10	U	U	25	U	U	7	U	UJ	34	U	U	17	U	U
Benzene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
1,2-Dichloroethane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Trichloroethene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
1,2-Dichloropropane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Bromodichloromethane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Methyl isobutyl ketone (MIBK)	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
cis-1,3-Dichloropropene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Toluene	10	U	U	25	U	U	7	U	UJ	34	U	U	17	U	U
trans-1,3-Dichloropropene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
1,1,2-Trichloroethane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
2-Hexanone	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Tetrachloroethene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Dibromochloromethane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Chlorobenzene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Ethylbenzene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
p/m-Xylene	19	U	U	50	U	U	15	U	UJ	27	U	U	34	U	U
o-Xylene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Styrene	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
Bromoform	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U
1,1,2,2-Tetrachloroethane	10	U	U	25	U	U	7	U	UJ	13	U	U	17	U	U

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. TB/B-Compound was detected in trip/method blank.

Validated 12/07/99
NEH, Inc.

Industri-Plex, Woburn, MA

Site Locations - Organic Sediment Data

Sample Location ID:	SD-13			SD-11			SD-10			SD-09		
Lab_ID:	42537-6			42562-8			42562-6			42563-5		
Date Sampled:	06/17/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
Freeze-Dried Sediment %solids:	79.1%			81.3%			78.7%			41.7%		
Analyte-Semivolatile Organic Compounds (SVOC)												
EPA Method 8270C												
bis(2-Chloroethyl)ether	330	U	U	330	U	U	340	U	U	640	U	U
Phenol	330	U	U	330	U	U	340	U	U	640	U	U
2-Chlorophenol	330	U	U	330	U	U	340	U	U	640	U	U
1,3-Dichlorobenzene	330	U	U	330	U	U	340	U	U	640	U	U
1,4-Dichlorobenzene	330	U	U	330	U	U	340	U	U	640	U	U
1,2-Dichlorobenzene	330	U	U	330	U	U	340	U	U	640	U	U
bis(2-chloroisopropyl)ether	330	U	UJ	330	U	UJ	340	U	UJ	640	U	UJ
Hexachloroethane	330	U	U	330	U	U	340	U	U	640	U	U
N-Nitroso-di-n-propylamine	330	U	UJ	330	U	UJ	340	U	UJ	640	U	UJ
Nitrobenzene	330	U	U	330	U	U	340	U	U	640	U	U
Isophorone	330	U	U	330	U	U	340	U	U	640	U	U
2-Nitrophenol	330	U	U	330	U	U	340	U	U	640	U	U
2,4-Dimethylphenol	330	U	U	330	U	U	340	U	U	640	U	U
bis(2-Chloroethoxy)methane	330	U	U	330	U	U	340	U	U	640	U	U
2,4-Dichlorophenol	330	U	U	330	U	U	340	U	U	640	U	U
1,2,4-Trichlorobenzene	330	U	U	330	U	U	340	U	U	640	U	U
Naphthalene	90	J	J	120	J	J	340	U	U	640	U	U
Hexachlorobutadiene	330	U	U	330	U	U	340	U	U	640	U	U
4-Chloro-3-methylphenol	330	U	U	330	U	U	340	U	U	640	U	U
Hexachlorocyclopentadiene	840	U	UJ	810	U	UJ	840	U	UJ	1600	U	UJ
2,4,6-Trichlorophenol	330	U	U	330	U	U	340	U	U	640	U	U
2-Chloronaphthalene	330	U	U	330	U	U	340	U	U	640	U	U
Acenaphthylene	110	J	J	98	J	J	340	U	U	640	U	U
Dimethylphthalate	330	U	U	330	U	U	340	U	U	640	U	U
2,6-Dinitrotoluene	330	U	U	330	U	U	340	U	U	640	U	U
Acenaphthene	100	J	J	240	J	J	340	U	U	640	U	U
2,4-Dinitrophenol	840	U	UJ	810	U	UJ	840	U	UJ	1600	U	UJ
2,4-Dinitrotoluene	330	U	U	330	U	U	340	U	U	640	U	U
4-Nitrophenol	840	U	UJ	810	U	UJ	840	U	UJ	1600	U	UJ
Fluorene	120	J	J	370			340	U	U	640	U	U
4-Chlorophenyl-phenylether	330	U	U	330	U	U	340	U	U	640	U	U
Diethylphthalate	330	U	U	460			340	U	U	640	U	U
4,6-Dinitro-2-methylphenol	840	U	UJ	810	U	UJ	840	U	UJ	1600	U	UJ
n-Nitrosodiphenylamine	330	U	U	170	J	J	100	J	J	640	U	U
4-Bromophenyl-phenylether	330	U	U	330	U	U	340	U	U	640	U	U

U-Compound [illegible] non-detected. Associated value is the sample-specific reporting limit. J-Result w[illegible]stimated due to QC exceedance. UJ-Compound was non-detected at estimated rep[illegible]ng limit

Industri-Plex, [illegible]urn, MA

Site Locations - Orga[illegible] Sediment Data

Validated 1[illegible] '99
NE[illegible] Inc.

Sample Location ID:	SD-13			SD-11			SD-10			SD-09		
Lab_ID:	42537-6			42562-8			42562-6			42563-5		
Date Sampled:	06/17/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
Freeze-Dried Sediment %solids:	79.1%			81.3%			78.7%			41.7%		
Hexachlorobenzene	330	U	U	330	U	U	340	U	U	640	U	U
Pentachlorophenol	840	U	UJ	810	U	UJ	840	U	UJ	1600	U	UJ
Phenanthrene	2000			7000	D		530			760		
Anthracene	330			590			340	U	U	640	U	U
Di-n-butylphthalate	330	U	U	330	U	U	340	U	U	640	U	U
Fluoranthene	4700			16000	D		1500			2300		
Pyrene	4100			14000	D		1300			1900		
Butylbenzylphthalate	140	J	J	330	U	U	340	U	U	640	U	U
3,3'-Dichlorobenzidine	330	U	U	330	U	U	340	U	U	640	U	U
Benzo[a]anthracene	1700			4000			460			750		
Chrysene	3000			9900	D		960			1500		
bis(2-Ethylhexyl)phthalate	580			1100			540			1500		
Di-n-octylphthalate	330	U	U	330	U	U	340	U	U	640	U	U
Benzo[b]fluoranthene	3800			10000	D		1100			1500		
Benzo[k]fluoranthene	2300			5900			910			1500		
Benzo[a]pyrene	2600			7200	D		690			1100		
Indeno[1,2,3-cd]pyrene	2200			4900			560			850		
Dibenz[a,h]anthracene	530			1200			110	J	J	180	J	J
Benzo[g,h,i]perylene	1500			3700			480			720		
2-Methylphenol	330	U	U	330	U	U	340	U	U	640	U	U
4-Methylphenol	330	U	U	330	U	U	340	U	U	640	U	U
4-Chloroaniline	330	U	U	330	U	U	340	U	U	640	U	U
2-Methylnaphthalene	330	U	U	330	U	U	340	U	U	640	U	U
2,4,5-Trichlorophenol	840	U	U	810	U	U	840	U	U	1600	U	U
2-Nitroaniline	840	U	U	810	U	U	840	U	U	1600	U	U
3-Nitroaniline	330	U	U	330	U	U	340	U	U	640	U	U
Dibenzofuran	330	U	U	240	J	J	340	U	U	640	U	U
4-Nitroaniline	840	U	U	810	U	U	840	U	U	1600	U	U
Carbazole	320	J	J	970			340	U	U	640	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA

Site Locations - Organic Sediment Data

Validated 12/07/99
NEH, Inc.

Sample Location ID:	SD-08			SD-07			SD-06			SD-05		
Lab_ID:	42563-7			42563-10			42563-12			42563-1		
Date Sampled:	06/22/99	Lab	DV	06/23/99	Lab	DV	06/23/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
Freeze-Dried Sediment %solids:	78.0%			61.1%			87.7%			97.3%		
Analyte-Semivolatile Organic Compounds (SVOC)												
EPA Method 8270C												
bis(2-Chloroethyl)ether	340	U	U	430	U	U	300	U	U	810	U	U
Phenol	120	J	J	430	U	U	300	U	U	340	J	J
2-Chlorophenol	340	U	U	430	U	U	300	U	U	810	U	U
1,3-Dichlorobenzene	340	U	U	430	U	U	300	U	U	810	U	U
1,4-Dichlorobenzene	340	U	U	430	U	U	300	U	U	810	U	U
1,2-Dichlorobenzene	340	U	U	430	U	U	300	U	U	810	U	U
bis(2-chloroisopropyl)ether	340	U	UJ	430	U	UJ	300	U	UJ	810	U	UJ
Hexachloroethane	340	U	U	430	U	U	300	U	U	810	U	U
N-Nitroso-di-n-propylamine	340	U	UJ	430	U	UJ	300	U	UJ	810	U	UJ
Nitrobenzene	340	U	U	430	U	U	300	U	U	810	U	U
Isophorone	340	U	U	430	U	U	300	U	U	810	U	U
2-Nitrophenol	340	U	U	430	U	U	300	U	U	810	U	U
2,4-Dimethylphenol	340	U	U	430	U	U	300	U	U	810	U	U
bis(2-Chloroethoxy)methane	340	U	U	430	U	U	300	U	U	810	U	U
2,4-Dichlorophenol	340	U	U	430	U	U	300	U	U	810	U	U
1,2,4-Trichlorobenzene	340	U	U	430	U	U	300	U	U	810	U	U
Naphthalene	190	J	J	430	U	U	110	J	J	550	J	J
Hexachlorobutadiene	340	U	U	430	U	U	300	U	U	810	U	U
4-Chloro-3-methylphenol	340	U	U	430	U	U	300	U	U	810	U	U
Hexachlorocyclopentadiene	850	U	UJ	1100	U	UJ	760	U	UJ	2000	U	UJ
2,4,6-Trichlorophenol	340	U	U	430	U	U	300	U	U	810	U	U
2-Chloronaphthalene	340	U	U	430	U	U	300	U	U	810	U	U
Acenaphthylene	340	U	U	430	U	U	80	J	J	810	U	U
Dimethylphthalate	340	U	U	430	U	U	300	U	U	810	U	U
2,6-Dinitrotoluene	340	U	U	430	U	U	300	U	U	810	U	U
Acenaphthene	130	J	J	150	J	J	300	U	U	390	J	J
2,4-Dinitrophenol	850	U	UJ	1100	U	UJ	760	U	UJ	2000	U	UJ
2,4-Dinitrotoluene	340	U	U	430	U	U	300	U	U	810	U	U
4-Nitrophenol	850	U	UJ	1100	U	UJ	760	U	UJ	2000	U	UJ
Fluorene	240	J	J	330	J	J	300	U	U	680	J	J
4-Chlorophenyl-phenylether	340	U	U	430	U	U	300	U	U	810	U	U
Diethylphthalate	340	U	U	110	J	J	300	U	U	810	U	U
4,6-Dinitro-2-methylphenol	850	U	UJ	1100	U	UJ	760	U	UJ	2000	U	UJ
n-Nitrosodiphenylamine	340	U	U	150	J	J	150	J	J	810	U	U
4-Bromophenyl-phenylether	340	U	U	430	U	U	300	U	U	810	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, W rn, MA

Site Locations - Organ. ediment Data

Sample Location ID:	SD-08			SD-07			SD-06			SD-05		
Lab_ID:	42563-7			42563-10			42563-12			42563-1		
Date Sampled:	06/22/99	Lab	DV	06/23/99	Lab	DV	06/23/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
Freeze-Dried Sediment %solids:	78.0%			61.1%			87.7%			97.3%		
Hexachlorobenzene	340	U	U	430	U	U	300	U	U	810	U	U
Pentachlorophenol	850	U	UJ	1100	U	UJ	760	U	UJ	2000	U	UJ
Phenanthrene	2000			4100			1000			5900		J
Anthracene	220	J	J	410	J	J	260	J	J	640	J	J
Di-n-butylphthalate	340	U	U	430	U	U	300	U	U	810	U	U
Fluoranthene	3900			8300	D		3400			12000		J
Pyrene	3000			6500			2600			7900		J
Butylbenzylphthalate	340	U	U	430	U	U	300	U	U	810	U	U
3,3'-Dichlorobenzidine	340	U	U	430	U	U	300	U	U	810	U	U
Benzo[a]anthracene	1100			2200			1300			3100		J
Chrysene	2200			4900			1800			6500		J
bis(2-Ethylhexyl)phthalate	1000			2600			37000	D		3700		
Di-n-octylphthalate	340	U	U	430	U	U	300	U	U	810	U	U
Benzo[b]fluoranthene	2200			5500			2100			6400		J
Benzo[k]fluoranthene	1800			3400			1700			5600		J
Benzo[a]pyrene	1400			3000			1400			3700		J
Indeno[1,2,3-cd]pyrene	1200			2400			940			3100		J
Dibenz[a,h]anthracene	220	J	J	470			210	J	J	670	J	J
Benzo[g,h,i]perylene	940			1700			760			2300		J
2-Methylphenol	340	U	U	430	U	U	300	U	U	230	J	J
4-Methylphenol	340	U	U	430	U	U	300	U	U	810	U	U
4-Chloroaniline	340	U	U	430	U	U	300	U	U	810	U	U
2-Methylnaphthalene	340	U	U	430	U	U	300	U	U	810	U	U
2,4,5-Trichlorophenol	850	U	U	1100	U	U	760	U	U	2000	U	U
2-Nitroaniline	850	U	U	1100	U	U	760	U	U	2000	U	U
3-Nitroaniline	340	U	U	430	U	U	300	U	U	810	U	U
Dibenzofuran	150	J	J	170	J	J	300	U	U	460	J	J
4-Nitroaniline	850	U	U	1100	U	U	760	U	U	2000	U	U
Carbazole	400			670			160	J	J	1100		J

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Sediment Data

Validated 12/07/99
NEH, Inc.

Sample Location ID:	SD-05DUP		
Lab_ID:	42563-3		
Date Sampled:	06/22/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.
Freeze-Dried Sediment %solids:	55.1%		
Analyte-Semivolatile Organic Compounds (SVOC)	Field Duplicate		
EPA Method 8270C			
bis(2-Chloroethyl)ether	1900	U	U
Phenol	760	JD	J
2-Chlorophenol	1900	U	U
1,3-Dichlorobenzene	1900	U	U
1,4-Dichlorobenzene	1900	U	U
1,2-Dichlorobenzene	1900	U	U
bis(2-chloroisopropyl)ether	1900	U	UJ
Hexachloroethane	1900	U	U
N-Nitroso-di-n-propylamine	1900	U	UJ
Nitrobenzene	1900	U	U
Isophorone	1900	U	U
2-Nitrophenol	1900	U	U
2,4-Dimethylphenol	1900	U	U
bis(2-Chloroethoxy)methane	1900	U	U
2,4-Dichlorophenol	1900	U	U
1,2,4-Trichlorobenzene	1900	U	U
Naphthalene	1100	JD	J
Hexachlorobutadiene	1900	U	U
4-Chloro-3-methylphenol	1900	U	U
Hexachlorocyclopentadiene	4800	U	UJ
2,4,6-Trichlorophenol	1900	U	U
2-Chloronaphthalene	1900	U	U
Acenaphthylene	1900	U	U
Dimethylphthalate	1900	U	U
2,6-Dinitrotoluene	1900	U	U
Acenaphthene	1200	JD	J
2,4-Dinitrophenol	4800	U	UJ
2,4-Dinitrotoluene	1900	U	U
4-Nitrophenol	4800	U	UJ
Fluorene	2000	D	J
4-Chlorophenyl-phenylether	1900	U	U
Diethylphthalate	1900	U	U
4,6-Dinitro-2-methylphenol	4800	U	UJ
n-Nitrosodiphenylamine	1900	U	U
4-Bromophenyl-phenylether	1900	U	U

U-Compound non-detected. Associated value is the sample-specific reporting limit. J-Result wa imated due to QC exceedance. UJ-Compound was non-detected at estimated rep limit.

Industri-Plex, V ırn, MA
Site Locations - Orgar.. Sediment Data

Sample Location ID:	SD-05DUP		
Lab_ID:	42563-3		
Date Sampled:	06/22/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.
Freeze-Dried Sediment %solids:	55.1%		
Hexachlorobenzene	1900	U	U
Pentachlorophenol	4800	U	UJ
Phenanthrene	15000	D	J
Anthracene	1800	JD	J
Di-n-butylphthalate	1900	U	U
Fluoranthene	26000	D	J
Pyrene	19000	D	J
Butylbenzylphthalate	1900	U	U
3,3'-Dichlorobenzidine	1900	U	U
Benzo[a]anthracene	6600	D	J
Chrysene	14000	D	J
bis(2-Ethylhexyl)phthalate	4500	D	
Di-n-octylphthalate	1900	U	U
Benzo[b]fluoranthene	14000	D	J
Benzo[k]fluoranthene	11000	D	J
Benzo[a]pyrene	9300	D	J
Indeno[1,2,3-cd]pyrene	7300	D	J
Dibenz[a,h]anthracene	1500	JD	J
Benzo[g,h,i]perylene	5900	D	J
2-Methylphenol	530	JD	J
4-Methylphenol	1900	U	U
4-Chloroaniline	1900	U	U
2-Methylnaphthalene	1900	U	U
2,4,5-Trichlorophenol	4800	U	U
2-Nitroaniline	4800	U	U
3-Nitroaniline	1900	U	U
Dibenzofuran	1200	JD	J
4-Nitroaniline	4800	U	U
Carbazole	3100	D	J

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Reference Locations - Organic Sediment Data

Validated 12/07/99
NEH, Inc.

Sample Location ID:	SD-01			SD-02			SD-03			SD-04			SD-12		
Lab_ID:	42562-4			42562-1			42541-1			42537-1			42537-4		
Date Sampled:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/18/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
Freeze-dried %solids:	87.0%			92.3%			77.7%			67.0%			83.6%		
Analyte-Semivolatile Organic Compounds (SVOC)															
EPA Method 8270C															
bis(2-Chloroethyl)ether	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Phenol	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
2-Chlorophenol	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
1,3-Dichlorobenzene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
1,4-Dichlorobenzene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
1,2-Dichlorobenzene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
bis(2-chloroisopropyl)ether	300	U	UJ	1000	U	UJ	340	U	UJ	400	U	UJ	320	U	UJ
Hexachloroethane	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
N-Nitroso-di-n-propylamine	300	U	UJ	1000	U	UJ	340	U	UJ	400	U	UJ	320	U	UJ
Nitrobenzene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Isophorone	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
2-Nitrophenol	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
2,4-Dimethylphenol	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
bis(2-Chloroethoxy)methane	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
2,4-Dichlorophenol	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
1,2,4-Trichlorobenzene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Naphthalene	300	U	U	1000	U	U	160	J	J	110	J	J	160	J	J
Hexachlorobutadiene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
4-Chloro-3-methylphenol	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Hexachlorocyclopentadiene	760	U	UJ	2600	U	UJ	850	U	UJ	990	U	UJ	790	U	UJ
2,4,6-Trichlorophenol	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
2-Chloronaphthalene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Acenaphthylene	150	J	J	1000	U	U	390			200	J	J	190	J	J
Dimethylphthalate	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
2,6-Dinitrotoluene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Acenaphthene	300	U	U	1000	U	U	110	J	J	400	U	U	81	J	J
2,4-Dinitrophenol	760	U	UJ	2600	U	UJ	850	U	UJ	990	U	UJ	790	U	UJ
2,4-Dinitrotoluene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
4-Nitrophenol	760	U	UJ	2600	U	UJ	850	U	UJ	990	U	UJ	790	U	UJ
Fluorene	300	U	U	1000	U	U	210	J	J	160	J	J	190	J	J
4-Chlorophenyl-phenylether	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Diethylphthalate	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
4,6-Dinitro-2-methylphenol	760	U	UJ	2600	U	UJ	850	U	UJ	990	U	UJ	790	U	UJ
n-Nitrosodiphenylamine	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
4-Bromophenyl-phenylether	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Hexachlorobenzene	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Pentachlorophenol	760	U	UJ	2600	U	UJ	850	U	UJ	990	U	UJ	790	U	UJ
Phenanthrene	850			1000	U	U	3300			1600			1500		
Anthracene	150	J	J	1000	U	U	440			320	J	J	380		
Di-n-butylphthalate	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. UJ-Compound was non-detected at estimated rep[illegible] limit.

Industri-Plex, W n, MA
Reference Locations - Or c Sediment Data

Validated 12 9
NEH, ..c.

Sample Location ID:	SD-01			SD-02			SD-03			SD-04			SD-12		
Lab_ID	42562-4			42562-1			42541-1			42537-1			42537-4		
Date Sampled:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/18/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
Freeze-dried %solids:	87.0%			92.3%			77.7%			67.0%			83.6%		
Analyte-Semivolatile Organic Compounds (SVOC)															
Fluoranthene	1500			1000	U	U	6400	D		3700			3100		
Pyrene	1700			1000	U	U	6100			3400			2900		
Butylbenzylphthalate	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
3,3'-Dichlorobenzidine	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Benzo[a]anthracene	640			1000	U	U	2100			1500			1400		
Chrysene	1100			1000	U	U	4400			2600			2100		
bis(2-Ethylhexyl)phthalate	94	J	J	1000	U	U	1200			180	J	J	100	J	J
Di-n-octylphthalate	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Benzo[b]fluoranthene	920			1000	U	U	4900			3000			2100		
Benzo[k]fluoranthene	840			1000	U	U	3200			2200			2000		
Benzo[a]pyrene	810			1000	U	U	3300			2100			1900		
Indeno[1,2,3-cd]pyrene	530			1000	U	U	2400			1800			1400		
Dibenz[a,h]anthracene	110	J	J	1000	U	U	530			350	J	J	320		
Benzo[g,h,i]perylene	500			1000	U	U	1700			1400			1100		
2-Methylphenol	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
4-Methylphenol	190	J	J	1000	U	U	340	U	U	400	U	U	320	U	U
4-Chloroaniline	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
2-Methylnaphthalene	300	U	U	1000	U	U	93	J	J	400	U	U	81	J	J
2,4,5-Trichlorophenol	760	U	U	2600	U	U	850	U	U	990	U	U	790	U	U
2-Nitroaniline	760	U	U	2600	U	U	850	U	U	990	U	U	790	U	U
3-Nitroaniline	300	U	U	1000	U	U	340	U	U	400	U	U	320	U	U
Dibenzofuran	300	U	U	1000	U	U	120	J	J	120	J	J	120	J	J
4-Nitroaniline	760	U	U	2600	U	U	850	U	U	990	U	U	790	U	U
Carbazole	300	U	U	1000	U	U	370			220	J	J	170	J	J

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to QC exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Sediment Data

Validated 12/07/99
NEH, Inc.

Sample Location ID:	SD-13				SD-11			SD-10			SD-09		
Lab_ID:	42537-6				42562-8			42562-6			42563-5		
Date Sampled:	06/17/99	Lab	DV	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
Freeze-Dried Sediment %solids:	79.1%				81.3%			78.7%			41.7%		
Analyte-Pesticides and PCBs													
EPA Methods 8081A and 8082													
Alpha-BHC	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Gamma-BHC	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Beta-BHC	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Delta-BHC	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Heptachlor	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Aldrin	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Heptachlor Epoxide	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Gamma Chlordane	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Alpha Chlordane	0.84	U	U	J	0.81	U	U	0.84	U	U	1.6	U	U
Endosulfan I	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
4,4'-DDE	17				0.81	U	U	2.7			1.6	U	U
Dieldrin	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Endrin	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
4,4'-DDD	22				0.81	U	U	3.2			1.6	U	U
Endosulfan II	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
4,4'-DDT	13				0.81	U	U	0.84	U	U	1.6	U	U
Endosulfan Sulfate	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Methoxychlor	4.2	U	U	U	4.1	U	U	4.2	U	U	8.0	U	U
Endrin Ketone	0.84	U	U	U	0.81	U	U	0.84	U	U	1.6	U	U
Toxaphene	8.4	U	U	U	8.1	U	U	8.4	U	U	16	U	U
Aroclor 1016	3.3	U	U	U	3.3	U	U	3.4	U	U	6.4	U	U
Aroclor 1221	3.3	U	U	U	3.3	U	U	3.4	U	U	6.4	U	U
Aroclor 1232	3.3	U	U	U	3.3	U	U	3.4	U	U	6.4	U	U
Aroclor 1242	3.3	U	U	U	3.3	U	U	3.4	U	U	6.4	U	U
Aroclor 1248	3.3	U	U	U	3.3	U	U	3.4	U	U	6.4	U	U
Aroclor 1254	3.3	U	U	U	3.3	U	U	3.4	U	U	6.4	U	U
Aroclor 1260	3.3	U	U	U	3.3	U	U	3.4	U	U	6.4	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Site Locations - Organic Sediment Data

Validated 12/07/99
NEH, Inc.

Sample Location ID:	SD-08			SD-07			SD-06			SD-05			SD-05DUP		
Lab_ID:	42563-7			42563-10			42563-12			42563-1			42563-3		
Date Sampled:	06/22/99	Lab	DV	06/23/99	Lab	DV	06/23/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
Freeze-Dried Sediment %solids:	78.0%			61.1%			87.7%			97.3%			55.1%		
Analyte-Pesticides and PCBs													Field Duplicate		
EPA Methods 8081A and 8082															
Alpha-BHC	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Gamma-BHC	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Beta-BHC	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Delta-BHC	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Heptachlor	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Aldrin	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Heptachlor Epoxide	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Gamma Chlordane	0.85	U	U	1.1	U	U	93	P	J	2.0	U	U	1.2	U	U
Alpha Chlordane	0.85	U	U	1.1	U	U	92		J	2.0	U	U	1.2	U	U
Endosulfan I	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
4,4'-DDE	0.85	U	U	1.9	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Dieldrin	0.85	U	U	1.1		U	7.6	U	U	2.0	U	U	1.2	U	U
Endrin	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
4,4'-DDD	0.85	U	U	1.1	U	U	22	P	J	2.0	U	U	1.2	U	U
Endosulfan II	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
4,4'-DDT	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Endosulfan Sulfate	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Methoxychlor	4.3	U	U	5.4	U	U	38	U	UJ	10	U	U	6.0	U	U
Endrin Ketone	0.85	U	U	1.1	U	U	7.6	U	U	2.0	U	U	1.2	U	U
Toxaphene	8.5	U	U	11	U	U	76	U	U	20	U	U	12	U	U
Aroclor 1016	3.4	U	U	4.3	U	U	3.0	U	U	8.1	U	U	4.8	U	U
Aroclor 1221	3.4	U	U	4.3	U	U	3.0	U	U	8.1	U	U	4.8	U	U
Aroclor 1232	3.4	U	U	4.3	U	U	3.0	U	U	8.1	U	U	4.8	U	U
Aroclor 1242	3.4	U	U	4.3	U	U	3.0	U	U	8.1	U	U	4.8	U	U
Aroclor 1248	3.4	U	U	4.3	U	U	3.0	U	U	8.1	U	U	4.8	U	U
Aroclor 1254	3.4	U	U	4.3	U	U	3.0	U	U	8.1	U	U	4.8	U	U
Aroclor 1260	3.4	U	U	4.3	U	U	3.0	U	U	8.1	U	U	4.8	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA
Reference Location - Organic Sediment Data

Validated 12/07/99
NEH, Inc.

Sample Location ID:	SD-01			SD-02			SD-03			SD-04			SD-12		
Lab_ID:	42562-4			42562-1			42541-1			42537-1			42537-4		
Date Sampled:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/18/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV
Units:	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.	µg/Kg drywt	Qual.	Qual.
Freeze-dried %solids:	87.0%			92.3%			77.7%			67.0%			83.6%		
Analyte-Pesticides and PCBs															
EPA Methods 8081A and 8082															
Alpha-BHC	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
Gamma-BHC	0.76	U	U	2.6	U	U	0.85	U	UJ	0.99	U	U	0.79	U	U
Beta-BHC	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
Delta-BHC	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
Heptachlor	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
Aldrin	0.76	U	U	2.6	U	U	0.85	U	UJ	0.99	U	U	0.79	U	U
Heptachlor Epoxide	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
Gamma Chlordane	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
Alpha Chlordane	23	U	J	2.6	U	U	69	E	J	0.99	U	U	0.79	U	U
Endosulfan I	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
4,4'-DDE	470	E		13			43	E		0.99	U	U	0.79	U	U
Dieldrin	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
Endrin	0.76	U	U	2.6	U	U	0.85	U	UJ	0.99	U	U	0.79	U	U
4,4'-DDD	200	E		25	P		97	E		27			8.0		
Endosulfan II	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
4,4'-DDT	180	E		2.6	U	U	26		J	0.99	U	U	0.79	U	U
Endosulfan Sulfate	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
Methoxychlor	3.8	U	U	13	U	U	4.2	U	U	4.9	U	U	4.0	U	U
Endrin Ketone	0.76	U	U	2.6	U	U	0.85	U	U	0.99	U	U	0.79	U	U
Toxaphene	7.6	U	U	26	U	U	8.5	U	U	9.9	U	U	7.9	U	U
Aroclor 1016	3.0	U	U	10.4	U	U	3.4	U	U	3.9	U	U	3.2	U	U
Aroclor 1221	3.0	U	U	10.4	U	U	3.4	U	U	3.9	U	U	3.2	U	U
Aroclor 1232	3.0	U	U	10.4	U	U	3.4	U	U	3.9	U	U	3.2	U	U
Aroclor 1242	3.0	U	U	10.4	U	U	3.4	U	U	3.9	U	U	3.2	U	U
Aroclor 1248	3.0	U	U	10.4	U	U	3.4	U	U	3.9	U	U	3.2	U	U
Aroclor 1254	3.0	U	U	10.4	U	U	3.4	U	U	3.9	U	U	3.2	U	U
Aroclor 1260	3.0	U	U	10.4	U	U	3.4	U	U	3.9	U	U	3.2	U	U

U-Compound was non-detected. Associated value is the sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at estimated reporting limit.

Industri-Plex, Woburn, MA.
Sediments 1999

8260B Data Usability Review

VOC

IIIA. Review of Volatile Organic Data

1. Holding Times

Holding times and QC association with the samples are reviewed to ensure the accuracy of the reported results. The table on the following page (Table 1a) was completed to document the holding times and QC association.

Review the Volatile Organic Analysis Data Sheet.

Were the holding time requirements (surface waters analyzed within 14 days; and sediments analyzed within 7 and 14 days of sampling, for low-level and high-level preservation) met for each sample? Yes / No. If no, list below the affected samples and the number of days outside of holding time.

Action: If the holding times were slightly exceeded, estimate (J and UJ) positive and non-detect results. If the holding times were grossly exceeded (more than twice the allowed holding time), professional judgment should be used to determine the action necessary. Evaluation of screening, undiluted and dilution analyses, if available, should be made to determine the impact of the holding time violation on the data quality (e.g., whether or not positive values are estimated (J) and whether non-detected values should be estimated (UJ) or rejected (R)).

Comments:

All HTs met

Note: Sample SD-5 and SD-5DUP analyzed as Low-level Volatiles on 6/27/99 with some analytes above calibration Range. Laboratory then reran SD-5 + SD-5DUP as High-level Samples (on 6/29/99) (methanol preserved) and reported these data as SD-5E + SD-5DUPE

No Action Required.

Temp 7°C on COC D 6/21/99. Samples didn't get to cool-down from field → lab (courier same day). No action - affects waters only.

Table 1a. Holding Time and Associated QC Table

Sample Matrix: Sediments - 14 Sediments + 1 MS/MSD + 1 TB

Sample ID	Date/Time Sampled	Field Blank	Method Blank	LCS	MS/MSD	Date/Time Analyzed	Inst.
SD04 (42537-2)	6/17/99 11:30	TB 6/17	B2062302	Q2062301 Q2062302	SD-03MS +	6/24 01:09	V-2
SD12 (-5)	6/17 13:18		B2062102	Q2062101 Q2062102	SD-03MSD	6/21 21:34	V-2
SD-13 (-7)	6/17 15:30					6/21 22:05	V-2
Trip Blank (-8)	6/17		B1062902	Q1062901 Q1062902		6/29 21:54	V-1
SD-03 (42541-2)	6/18 11:30		B2061902	Q2061901 Q2061902		6/19 15:37	V-2
SD-03MS (42541-2MS)	6/18 12:00					6/19 16:08	V-2
SD-03MSD (42541-2MSD)	6/18 12:30					6/19 16:39	V-2
SD-2 (42562-2)	6/21		B2062602	Q2062601 Q2062602		6/26 22:10	V-2
SD-01 (-5)	6/21					6/26 22:40	V-2
SD-10 (-7)	6/21					6/26 23:10	V-2
SD-11 (-9)	6/21					6/26 23:40	V-2
SD-5 (42563-2)	6/22		B2062702 + B2062803	Q2062801 Q2062702		6/27 19:52 + 6/29 01:3[illegible]	V-2
SD-5DUP (-4)	6/22					6/27 2[illegible] + 6/29 02[illegible]	V-[illegible]
SD-9 (-6)	6/22		B2062702	Q2062701 Q2062702		6/27 22:56	V-2
SD-8 (-8)	6/22					6/27 23:26	V-2
SD-7 (-11)	6/23		B2062802	Q2062801 Q2062802		6/29 03:34	V-2
SD-6 (-13)	6/23					6/29 04:04	V-2

2. GC/MS Instrument Performance Check

The BFB instrument performance checks (tunes) are reviewed to assess the accuracy and sensitivity of the results relative to instrument performance.

Review the tune summaries for BFB

Were all Method 8260B defined mass calibration and ion abundance criteria met for the BFB analyses? Yes / No. If no, list below the tune and affected samples.

Review the raw data for one tune. Did the laboratory obtain the BFB mass spectrum in a straight-forward manner (e.g., average of three scans centered across the BFB peak with background subtraction from a scan within 20 scans prior to the BFB scan)? Yes / No. If no, list below the method used to obtain the mass spectrum and the affected samples.

Were all samples analyzed within 12 hours of an acceptable tune? Yes / No. If no, list below the affected samples.

Action: If the mass assignment criteria were not met (e.g., base peak assigned to m/z 96 instead of m/z 95), reject (R) all associated data. If the ion abundance criteria were not met, sound technical judgment should be used in evaluating whether or not the data require estimation (U and UJ) or rejection (R) (e.g., the criteria requirements for the m/z 95/96, 174/175, 174/176 and 176/177 ratios are most important for proper tune while the relative abundances for m/z 50 and 75 are of lesser importance.)

Comments:

The BFB Tune Summaries as shown on Form 5's have the latest CLP SOW Criteria - the raw BFB data of the instrument correctly used 8260B criteria.

All Tunes met criteria - some single scan (OK by 8260B) and some averaged scans for BFB results

No Action Required.

3. Initial Calibration

The initial calibration data are reviewed to determine if the standards were compliant with the method protocols.

Review the Initial Calibration Data Summary. Check and recalculate the RRFs, $\overline{RRF}$ and %RSD for at least one volatile analyte across the ICAL. Does the RRF and %RSD check back to the raw data? Yes / No. Were the RRFs for all analytes in the standard all greater than or equal to 0.05? Yes / No

Were at least five concentration levels of each compound analyzed during the initial calibration? Yes / No
Were all calibration standards analyzed within 12 hours of BFB tune? Yes / No

Was the lowest initial calibration standard at a concentration equivalent to the sample-specific reporting limit? Yes / No

Were retention times for each target analyte stable across the calibration (i.e., minimum drift)? Yes / No

Did the initial calibration meet %RSD criteria of ≤ 30% for all analytes (surrogates and targets) across the calibration range? Yes / No.

Did the initial calibrations meet %RSD criteria of ≤ 15% for target analytes and surrogates across the calibration range? Yes / No. If no, was a calibration curve used for quantitation of results and was the correlation coefficient for the curve ≥ 0.99? Yes / No. Was the curve forced through the origin? Yes / No
If no, list below all the affected samples. For Methylene Chloride - See page 4B-VOA

Action: If the %RSD >30% and average RRF ≥0.05, qualify positive and non-detected results as estimated (J and UJ). If the %RSD >30% and average RRF < 0.05 estimate positive results (J) and rejecy non-detected results (R). If the %RSD ≤ 30% and average RRF < 0.05 estimate positive results (J) and reject non-detected results (R). Sound technical judgment should be used in qualification of the data. The results for each sample associated with ICAL should be evaluated to determine if a result reported would be impacted by the mis-calibration.

Comments: ICAL VOA #2 6/26/99

ICAL Check: Compound Checked Acetone

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Avg. RRF	%RSD
Concentration	5 ug/L	10 ug/L	50 ug/L	100 ug/L	200 ug/L			
Response Cpd	7987	11074	39313	73080	126414			
Conc, IS	50 ug/L	50	50	50	50			
Response IS	68719	64714	63357	60488	55909			
RRF	1.162	0.856	0.620	0.604	0.565		0.761	33.0%

4 ICAL - VOA#1 6/23/99 + VOA#2 6/16, 6/23 + 6/26/99

VOA#1 ICAL 6/23/99, Lowest Std at 2 ug/L except for Acetone and

Continued on next page

Elimination of low point for Methylene chloride resulted in %RSD < 30% => non-detect result uncertain (requiring UJ)

Additional Notes: VOA#1 6/23/99 ICAL Continued

Methylene Chloride which had lowest ICAL of 5 ug/L - RLs for Trip Blank (only sample associated with this Time) + MB were properly elevated by Lab (i.e. Reported Correctly).

- % RSD for Bromomethane = 38.2% + Methylene Chloride = 30.8% - All others OK

* ∴ Action: Results in Trip Blank (42537-8) have been qualified as estimated for ~~Bromomethane~~ & Methylene Chloride (UJ). Elimination of high point of Bromomethane ICAL gave %RSD = 28% => ND OK - no action.

VOA #2 6/16/99 ICAL

Bromomethane lowest standard at 10 ug/L

Acetone lowest std at 5 ug/L

Methylene chloride at 5 ug/L

%RSDs all ≤ 30%, $\overline{RRF}$ > 0.05

∴ SD-03, SD-03MS, SD-03MSD, SD-12 + SD-13 results checked to determine if RL properly reported. OK - Lab reported these Compounds at the correct sample-specific RL.

VOA #2 6/23/99 ICAL

Elimination of high or low point in ICAL had little effect on %RSD for acetone or methylene chloride

Acetone lowest std at 5 ug/L and %RSD = 48.8%

Methylene Chloride lowest std at 5 ug/L and %RSD = 55.5%

Chloroform lowest std at 5 ug/L

All other %RSDs < 30% - All RRFs > 0.05

Carbon Tetrachloride lowest std at 5 ug/L

Toluene lowest std at 5 ug/L

∴ SD04 checked to make sure RL properly adjusted for those Compounds.

* Action: Result for Acetone + Methylene chloride in SD04 qualified as estimated (UJ + J, respectively). Methylene chloride later negated; therefore (UJ) see ~~next~~ page 6.

Continued on next page

12/7/99

Additional Notes:

VOA#2 6/26/99 ICAL

Acetone Lowest std at 5 ug/L AND %RSD = 33.0%

Methylene chloride lowest std. at 5 ug/L AND %RSD = 71.3% however Linear curve fit used (not forced through zero) with $r^2 = 1.00$ ∴ SD-2, SD-01, SD-10, SD-11, SD-5, SD-5DUP, SD-9, SD-8 SD-7 and SD-6 checked to verify RL properly reported. Data verified that the results for these two compounds were properly reported. Elimination of lowest ICAL point for Acetone gave %RSD = 19.9%.

~~Action: Result for Acetone qualified as estimated (J + UJ) in Samples SD-2, SD-01, SD-10, SD-11, SD-5, SD-5DUP, SD-9, SD-8, SD-7 + SD-6 Due to %RSD > 30%~~ NCR 10/26/99

Acetone shown to be linear from 10 ug/L to 200 ⇒ Positive results quantitated within this region will be accepted. Non-detects and detects < 10 ppb will be qualified as estimated. (UJ + J)

* Actions:

SD-2 result > 10 ppb ⇒ Accepted

SD-1 result > 10 ppb ⇒ Accepted

SD-10 result > 10 ppb ⇒ Accepted

SD-11 result > 10 ppb ⇒ Accepted

SD-5 + SD-5DUP results > 10 ppb ⇒ Accepted

SD-9 > 10 ppb ⇒ Accepted

SD-8 > 10 ppb ⇒ Accepted

SD-7 > 10 ppb ⇒ Accepted

* SD-6 result < 10 ppb ⇒ Acetone qualified as estimated (J)

Note: 10 ppb judged versus on-column concentrations prior to application of sample-specific factors.

~~* Elimination of lowest or highest point in Methylene chloride curve did not reduce %RSD to ≤ 30% ⇒ All results for Methylene chloride qualified as estimated (UJ)~~ NCR 10/26/99 No Action for methylene chloride since linear curve used.

4. Continuing Calibration Check

The continuing calibration data are reviewed to determine if the standards were contractually compliant.

Review the Continuing Calibrations and Summaries. Check and recalculate the RRF and %Difference (%D) for at least one of the target volatile compounds in one of the CCALs. Does the RRF and %D check back to the raw data? Yes / No. Were the RRFs for all analytes in the standard all ≥ 0.05? Yes / No

Was a continuing calibration check performed every 12 hours following tuning verification of the instrument? Yes / No. If no, list below all the affected samples.

Were the target analytes recovered within the expected retention time window based upon the initial calibration (i.e., drift of instrument was acceptable)? Yes / No.

Did the continuing calibrations meet 8260B criteria for verification of %D ≤ ±25%? Yes / No. If no, list below the outliers and the affected samples.

Action: If the %D > ± 25% and the CCAL RRF ≥ 0.05, estimate positive and non-detected results (J and UJ) for samples analyzed following this standard for the compound(s) that was outside of calibration. If the RRF <0.05 qualify positive results as estimated (J) and reject (R) non-detected results as unusable.

Comments: VOA #2 6/27/99 CCAL

CCAL Check: Standard ID C266270 2 : Compound Checked Benzene

Responses	RRF	avg. RRF ICAL	% Difference
Cpd: 1353375	24.046	22.948	-4.8 ✓
IS: 56283 @ SD			

CCAL VOA#1 6/29/99 Bromomethane %D = -37.4%

* Action: Non-detected Bromomethane result in Trip Blank qualified as estimated (UJ)

CCAL VOA #2 6/19/99 Bromomethane %D = -32.4%

* Action: Non-detected Bromomethane results in SD-03, ~~SD-12 + SD-13~~ NWC 9/30/99 qualified as estimated (UJ)

CCAL VOA #2 6/21/99 Chloromethane %D = 25.6% + Bromomethane %D = -70.9%

* Action: Non-detected results for Chloromethane + Bromomethane in SD-12 and SD-13 qualified as estimated (UJ)

Continued on next page

Additional Notes:

- CCAL VOA#2 6/23/99 - Bromomethane %D = -32.4%; Acetone %D = 25.7%; and Methylene chloride %D = 30.1%.
* Action: Results for Bromomethane, Acetone and Methylene Chloride in sample SD04 qualified as estimated (UJ + J).

- CCAL VOA #2 6/26/99 - Methylene Chloride RRF compared to RRF with %D = 36.7%. However, ICAL was to use the Linear fit since %RSD > 30% for methylene chloride. This compound was checked in CCAL to determine % Drift

Linear fit from ICAL ⇒

Response Ratio = 5.15 × Amt Ratio + 1.88

Response methylene chloride = 414306 ; Response IS (at 50 µg/L) = 55705

$$\frac{\text{Amt. } MeCl_2}{50} = \frac{\left(\frac{414306}{55705} - 1.88\right)}{5.15}$$

∴ Amt. $MeCl_2$: 53.96 µg/L

$$\% \text{ Drift} = -\frac{53.96 - 50}{50} = -7.9\% \quad - \text{ OK}$$

No Action Required for this CCAL

- CCAL VOA #2 ~~6/26/99~~ WRE 9/30/99 6/27/99

Chloromethane %D = 27.3%, 2-Bromo-1-chloropropane -34.1%; 1-Chloro-2-fluorobenzene = -34.9% + 1,4-Dichlorobutane = -38.2% - These last 3 compounds were Surrogates that are added for Medium-Level (or High-Level) VOA Soil Analysis

$MeCl_2$ %D = 43.8%; however, recalculation of Methylene Chloride using the ICAL equation gave % Drift = +8.3% ⇒ methylene chloride Acceptable in CCAL

* Action chloromethane result in samples SD-5, SD-5DUP + SD-8 + SD-9 have been qualified as estimated (UJ)

continued on next page

Additional Notes:

CCAL VOA #2 6/28 Chloromethane %D = 49.7%; Vinyl chloride 31.9%; Bromomethane 35.8% + Methylene chloride %D = 54.6%. Again, MeCl2 checked versus ICAL Linear Calibration and gave %Drift = +32.98%

Action: Results in Samples SD-7, SD-6, SD-5E + SD-5DUPE (high level analyses of SD-5 + SD-5E) qualified as estimated (J + UJ) for chloromethane, Vinyl chloride, Bromomethane and Methylene chloride.

High level analysis results for chloromethane, vinyl chloride, bromomethane, + methylene chloride not reported in project database for SD-5E + SD5DUPE

Proj. database includes both low + ~~high~~ level analysis for all VOCs except benzene, results as chosen during this DV review as definitive results for VOCs for these samples for individual compounds. [initials] 12/7/99.

Benzene reported from high-level analysis including compensation for amount of water present in the sample (see pg 11B). [initials] 12/7/99

5. Laboratory and Trip Blank Results

Laboratory and trip blank results are reviewed to assess the presence of contaminants, which affect the accuracy and sensitivity of the results. See Table 1a. where the Holding Time and Associated QC Table was completed for the samples within this SDG.

Was a Trip Blank associated with each sampling event for volatiles? Yes / No. If no, list below affected samples. TB only done for 6/17 for sediments

Was each sample analysis associated with the appropriate method blank, *ie.*, correct matrix, correct matrix level, same batch? Yes / No. If no, list below affected samples. All method Blanks were 5g soil ⇒ matrix matched. TB 6/17 was a Water TB (not matrix matched)

Review the reporting forms for each method and trip blank. Were any target compounds in the method blanks detected at concentrations above the Reporting Limit (RL)? Yes / No. If yes, were methylene chloride, acetone or 2-butanone the only compounds reported above the RL? Yes / No. If yes, was methylene chlroide < 2.5 times the RL and 2-butanone and acetone < 5 times the RL? Yes / No

Action: - Blanks should not contain contaminants above the RL except for methylene chloride, acetone and 2-butanone which must not be present above 2.5-5 times the RL (see above). The Blank Action Level is defined as five times the highest level seen in any of the matrix-matched blanks associated with this SDG, except if methylene chloride, acetone or 2-butanone are present, in which case the Blank action is ten times the highest level observed for these compounds in any matrix-matched blank. The following actions should be taken if conditions warrant :

1. If the blank is not matrix matched, qualify all sample data, for the contaminant associated with this blank, with BB, TB or EB, as appropriate.
2. If the reported result in a sample is below the reporting limit (sample < RL) and if a matrix-matched blank contains a result above the quantitation limit (blank > RL), the result in the sample should be negated (U) and raised to the sample-specific RL for that sample
3. If the sample result is between the reporting limit and the blank Action Level (RL < sample < Action Level), the result for the sample is negated (U) at the level found in the sample. Based on the level of contamination suspected in the sample, the reporting limit may be elevated. Professional judgment will be used in assessing the action needed.
4. If the sample result is greater than the RL and the blank Action Level, no action is taken.

Comments: TB6/17, B1062902, B2061902, B2062602, B2062803, B2062702, B2062802 +
Blanks evaluated: B2062302 (see page 2-VOA) for Blank Association.

Highest Blank: B2061902 - Methylene Chloride at 6 mg/kg - Blank Action = 60 mg/kg
Action taken: See page 6A - + 6B - for Blank Actions

Sample ID	Compound	Reported Result		Result based on Blank Action	
SD-03	methylene chloride	6 J		7 U	(raised to sample-spec RL)
SD-12	methylene chloride	11 J		42 U	
SD-13	methylene chloride	5 J		15 U	
SD-04	methylene chloride	9 J		34 U	
SD-04	chloroform	8 J		34 U	
SD-5	chloroform	11 J		18 U	
SD-5DUP	chloroform	9 J		16 U	

B1062902 Associated with TB reported 3J ug/L of methylene chloride. Since TB didn't report methylene chloride, no action taken.

Additional Notes:

- TB 6/17 was a Water Trip ⇒ Not matrix matched for the sediments ⇒ Since TB reported estimated results for Acetone (4J) and Chloroform (1J) at levels between Lab's MDL and the Reporting Limit. Since Several Matrix-matched Method Blanks also reported trace levels of Chloroform, no action to qualify chloroform results in the samples was made based on the TB results. For Acetone, all positive data was qualified with "TB" based on this non-matrix matched TB. However, it should be noted that 1) The TB was associated with 6/17/99 sampling event and that no other TB for sediments on 6/18, 6/22 + 6/23/99 was taken and 2) That for samples SD-12, SD-13, SD-3, SD-2, SD-11, SD-5, SD-5DUP, SD-9 and SD-8, the high (> 5 x RL) of Acetone reported in these samples was probably not related to sampling error. Samples SD-01, SD-10, SD-7 and SD-6 reported Acetone at relatively low concentrations (≤ 5 x RL) which may have been related to the Sampling.
- VBLK01 B261902 - associated with Sample SD-03 reported 6 ug/kg methylene chloride + 1J ug/kg Chloroform. Action taken (see page 6-VOA) to qualify/negate methylene chloride result in sample. No Chloroform reported for sample ⇒ No Action.
- VBLK01 B2062102 - Associated with SD-12 + SD-13 reported Methylene Chloride at 4J ug/kg and chloroform at 1J ug/kg. Chloroform not reported in either sample ⇒ No Action. Blank Action level for Methylene Chloride = 40 ug/kg (not corrected for sample dry-weight) - For SD-12 B.A level = 290 ug/kg - Lab reported 11J ⇒ methylene chloride result negated and level set to Sample specific RL. For SD-13 B.A level = 148 ug/kg - Lab reported 5J ⇒ methylene chloride result negated and level set to Sample specific RL.
- VBLK01 B2062302 Associated with SD04 - methylene chloride 3J, Chloroform 2 ug/kg. SD-04 % solids = 13.22% ⇒ Sample Specific B.A $MeCl_2$ = 227 ug/kg and Chloroform = 76 ug/kg. Levels reported in SD-04 < B.A so those values were negated and the level raised to the sample specific RL (34u)

continued on next page.

Additional Notes:

- VBLK01 B262602 reported chloroform at 1J ug/kg - Samples SD-01, SD-2, SD-10 + SD-11 associated with this Blank did not report Chloroform => No Action Required.
- VBLK B262702 reported chloroform at 1J ug/kg. Blank Action Level (uncorrected for sample dry weight) is 5 ug/kg. Sample SD-5 % solids = 10.98% => B.A Level = 46 ug/kg. Lab reported 11J ug/kg => Based on Blank Action, the chloroform result was negated and the level raised to the sample specific RL for Chloroform.
Sample SD-5 DUP % solids = 9.99% => B.A for chloroform = 50 ug/kg - Lab reported 9J ug/kg => Chloroform result negated and level raised to sample specific RL.
Samples SD 9 + SD-8 also associated with this Blank Did not report chloroform
- VBLK02 B2062802 reported chloroform at 1J - Samples SD-7, SD-6 + ~~SD [illegible] Trip Blank~~ NCR 10/1/99 Associated with this blank did not report positive results for chloroform therefore no action taken.
- VBLK03 B2062803 - medium-level Soil Blank was associated with medium-level reanalysis of SD-5 and SD-5Dup since Low-level analyses reported Acetone and Benzene over calibration range. The results for the medium-level analyses will only be used to report Acetone + Benzene. Chloroform in Low-level analyses already negated. SD-5E and SD-5E DUP chloroform results were reported at Trace levels - these were negated due to Blank Actions (Do not appear in Data Base) => Reported low level analyses for these compounds.

Sample ID	Compound	Reported Result	Result Based on Blank Action
SD-5E	~~790J~~ NCR 10/1 Chloroform	790JB	1300U
SD-5DUPE	Chloroform	780JB	1400U

DC 12/7/99

6. Surrogate Spike Recoveries

The surrogate spike recoveries are reviewed to assess the accuracy of the results relative to laboratory performance and specific sample matrix.

Review the Surrogate Recovery information for each field and quality control sample. For one sample, verify that the recoveries reported correspond to the raw data and that the recovery calculation was done properly. Were the recovery data reported properly? Yes / **No**.

Were the surrogate recoveries within QAPP defined and method-generated accuracy limits? **Yes / No.** If no, were the affected samples reanalyzed? **Yes / No.** List below the affected samples.

Action - If one volatile surrogate recovery exceeds the upper limit, estimate (J) positive due to a potential high bias of the results; no action is required for non-detect results. If one volatile surrogate recovery is below the lower accuracy limit but above 10% recovery, estimate (J and UJ) the positive and non-detect results due to a potential low bias in the results. If any surrogate recovery is below 10%, reject (R) non-detect results and estimate positive results (J) due to potential false negatives and low bias in the results, respectively.. List below the affected samples and required actions.

Comments:

Lab used Dibromofluoromethane Surrogate as a replacement for 1,2-Dichloroethane-d4 as written in QAPP (OK per method 8260B).

- SD-13 4-Bromofluorobenzene %Rec = 72% (according to narrative, sample was reanalyzed and still had BFB < criteria). Lab's criteria for BFB acceptance was 76-120% (QAPP criteria = 59-113%). Even though QAPP criteria met, 8260B criteria that lab establish acceptance limits requires that action be based on Lab's limits -

* Action: Results for SD-13 have been qualified as estimated (J + UJ) due to low surrogate recovery. Potential low bias.

- SD-5 Dibromofluoromethane %Rec = 149% (high outside)

SD-5DUP Dibromofluoromethane %Rec = 146% (high outside)

* Action: Results (positive) for SD-5 + SD-5DUP have been qualified as estimated (J). No action taken on non detected results.

- SD-5E (medium-level methanol extraction) - 2 Lab defined surrogates low (> 10%). The method surrogates were all within criteria. No action taken based on this finding - this means no actions for Benzene reported from medium-level (However, benzene result "J" for other DQ in Data Review) [illegible] 12/7/99

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

The matrix spike/matrix spike duplicate (MS/MSD) recoveries are reviewed to assess the accuracy of the results relative to the specific sample matrix and the relative percent differences (RPDs) are reviewed to assess the precision of the results relative to the specific sample matrix.

Review the unspiked sample, Matrix Spike, and Matrix Spike Duplicate (MS/MSD) raw data and recovery results. Were the recoveries for the MS/MSD calculated properly? **Yes** / **No**.

Did the laboratory perform MS/MSDs for each matrix and matrix level analyzed for each analytical batch prepared for analysis? **Yes** / **No**. If no, list below the affected samples.

Were the MS/MSD recoveries and precision within QAPP and method-generated accuracy limits? **Yes** / **No.** Were the RPDs between the MS/MSD within the QAPP precision criteria? **Yes** / **No.** If no, list below the affected compounds.

Was the %RSD for non-spiked compounds in the unspiked sample, MS and MSD ≤ 50%? **Yes** / **No** / **NA**

Action: No action is taken to the entire data set based on MS/MSD results alone. The unspiked sample may be qualified based on MS/MSD results as follows: if the MS/MSD recoveries were greater than the upper accuracy limit, estimate (J) positive results due to potential high bias; no action is required for non-detect results; if the MS/MSD recoveries were below the lower accuracy limit but above 10%, estimate (J and UJ) positive and non-detect results due to potential low bias; if a MS/MSD compound was recovered below 10%, estimate (J) positive results due to potential low bias and evaluate the non-detected results to determine whether estimation (UJ) or rejection (R) of the unspiked sample data is warranted. If the RPD between the MS and MSD > QAPP criteria, estimate (J and UJ) positive and non-detected results in the unspiked sample. If the %RSD, for a non-spiked compound, between the unspiked sample, MS, and MSD >50%, estimate (J) positive results and use professional judgement to qualify other detected and non-detected analytes.

Comments:

SD-03 MS + MSD done - % Recovery in MS for 5 spike compounds all < criteria but >10%. % Rec in MSD for 4 spike compounds all < criteria but >10%. All RPDs between MS/MSD acceptable.

Non-spike compounds

Cpd	SD-03	SD-03 MS	SD-03 MSD	% RSD	
Acetone	210 ug/kg	160 ug/kg	~~N+~~ 250 ug/kg	22%	OK ✓
MEK	60 ug/kg (>2xRL)	ND (8U)	54 ug/kg (>2xRL)	87%	

* Action: Since the majority of spiked compounds + 1 of the unspiked compounds was outside criteria (low) all results for SD-03 qualified as estimated (J + UJ). Precision for MS/MSD

[illegible] that recovery issues are matrix

8. Laboratory Control Sample and Standard Reference Material Analysis

The Laboratory Control Samples (LCS) and/or Standard Reference Material (SRM) are reviewed to assess the accuracy of the results relative to the analytical procedure.

Review the raw data and recovery information for the LCS/SRM .

Did the laboratory perform a LCS or SRM for each matrix and matrix level analyzed? **Yes / No.** If no, list below the affected samples.

Were the LCS or SRM recoveries within QAPP and method-generated accuracy requirements for recovery? **Yes / No.** If no, list below the affected compounds.

Action: . If the LCS or SRM recoveries are above criteria, estimate (J) positive results due to potential high bias, no qualification of non-detected results is necessary. If the LCS or SRM recoveries are between 10% and the lower recovery limit, estimate (J and UJ) positive and non-detect results for the samples associated with the analytical batch due to potential low bias in the results. If the recovery in the LCS or SRM is less than 10%, estimate (J) positive results due to low bias and reject (R) non-detect results due to potential false negatives.

See page 2-VOA where LCS reference to Samples given

Comments:

Q1069D1 + Q106902 -OK　　Q2062601 + Q2062602 -OK

Q2062101 + Q2062102 -OK　　Q2062701 + Q2062702 -OK

Q2061901 + Q2061902 -OK　　Q2062801 + Q2062802 -OK

Q2062301 + Q2062302 - 1,1-Dichloroethene and Trichloroethene in both LCS + LCSD high outside criteria - This set of LCS was associated with SD-04 only => Since 2 out of 5 LCS/LCSD Compounds > criteria, positive results should be estimated. ~~Action taken to qualify all detected results in SD-04 as estimated (J)~~ - No action required for non-detects (Sample SD-04 did not report positive results once blank action taken - see page 6-VOA) therefore - no action taken. ~~Potential high bias in estimated results.~~ DC 12/7/99

DC 12/7/99

No results qualified because the two detected results for methylene chloride + chloroform have been negated due to blank actions.

9. Internal Standards

The Internal Standard (IS) response in the samples and standards is evaluated to ensure that the analytical system was in control during analysis.

Were the IS areas for each sample and standard analyzed within -50 to + 100% of the continuing calibration? Yes/No. Were the retention times for the IS within ±30 seconds from the retention time established in the continuing calibration? Yes/ No.

Action: If an IS area is greater than +100% compared to the continuing calibration, qualify positive results as estimated (J), non-detects do not require action. If the IS area is below -50% but not lower than -80%, estimate positive and non-detected results (U and UJ). If the area drop off or retention time shift for the IS is too severe (>-80%), non-detected results may require rejection (R). Professional judgment must be used in evaluating the data associated with poor IS performance.

Comments:

Lab Spiked 4 Internal Standards for Analysis - Last IS = 1,4-Dichlorobenzene-d4 which is used to quantify Dichlorobenzenes, etc. that are relatively "non-volatile" volatiles - Lab calibrated the systems using standards that contained more analytes than the QAPP required for reporting for these samples.

- For Samples SD12 + SD-13 + SD-5 + SD-7 + SD-6 - This last IS was < -50% compared to CCAL IS but all were > -80%. Since this IS was not used to quantitate any of the analytes reported, no action was taken

- For Sample SD-6, IS Chlorobenzene-D5 was (-52.29) < -50% but > -80%.

Action: The results for Chlorobenzene, ethylbenzene, Xylenes, Styrene, Bromoform + 1,1,2,2-Tetrachloroethane have been qualified as estimated (UJ) since the associated IS for these analytes was recovered below criteria in Sample SD-6.

10. Sample Quantitation Limits

Review raw data and reporting forms. Did the sample-specific RLs meet the QAPP criteria? **Yes/No.** Did the laboratory accurately adjust sample reporting limits to account for sample specific preparation and analysis conditions? **Yes / No.**

Were all components reported in the samples quantitated within the calibration region of the instrument for the detected analytes? **Yes/No** Were the relative retention times for all components reported within the retention time windows established during initial calibration? **Yes/No**

If the sample analyses were performed at dilutions, were more concentrated analyses performed or was sample screening information included in the data package? **Yes / No.**

Were sample dilutions appropriate relative to scaling of the chromatograms and the calibration levels employed (e.g., peaks of interest within upper half of the chromatogram and quantitation done within the calibration range)? **Yes / No.**

Action - If the quantitation limits for non-detect results are lower than the lowest calibration standard, or if a positive result is detected outside of the calibration range, estimate positive and non-detected results (J and UJ).

Comments: The Reporting limits for the sample were above those given in the QAPP due to the low % solids content of the sediments (QAPP indicates RLs assumed 100% solids and would be affected by actual sample % solids). In addition, the lowest ICAL standard for all components but Methylene Chloride, Acetone, Bromoform, Chloroform, Toluene + Carbon Tetrachloride for some ICALs was above the 2 ug/L requested standard level and was actually at 5 ug/L (see pages 4A-VOA + 4B-VOA). All RLs correctly reported data using the appropriate lowest ICAL Std and correctly used the sample-specific weights + % solids.

Sample SD-5 + SD-5DUP Reported results for Acetone and Benzene which were above the calibration range for the low level volatiles analysis. The laboratory reran SD-5 + SD-5DUP as medium-level sediments (analyzed methanol extract) and reported

Continued on next page.

Additional Notes:

results for these medium-level analyses using an "E" suffix on the sample IDs. A comparison of the Benzene results for SD-5 & SD-5E and SD-5DUP with SD-5DUPE give reasonable comparability (i.e. SD-5 + SD-5DUP results were lower than SD-5E + SD-5DUPE as one might expect if the analysis were oversaturated and the "E" data were the same order of magnitude as the low-level analysis).

* Therefore, the Benzene result from the SD-5E + SD-5DUPE has been associated with the SD-5 + SD-5DUP Results in the project database. -See page 11B-VOA for Calculation

The Acetone data; however, between SD-5 + SD-5E and SD-5DUP + SD-5DUPE are not comparable:

	SD-5	SD-5E	SD-5DUP	SD-5DUPE
Acetone	2400 ug/kg	49000 ug/kg	2100 ug/kg	20000 ug/kg

There was no Methanol Trip Blank Associated with these medium-level sediments. The Methanol medium-level method Blank did not report Acetone. Based on professional judgment, using the medium-level Acetone results to associate with the field samples is not appropriate. The original Acetone results from the low-level analyses were reported <40% above the calibration range (i.e. highest standard at 200 ug/L and raw acetone data for samples was 276 ug/L and 264 ug/L). Therefore, the Acetone data reported for the low-level analyses in samples SD-05 and SD-05DUP have been accepted as reported; however,

* these data have been qualified as estimated (J) due to quantitation above the calibration range of the instruments.

DWC 12/7/99

Additional Notes: Lab Reported SD-5E + SD-5DUPE data using the amount of methanol preservative as being equal to the extract volume. However, since the samples contained low % solids.

SD-5E Benzene

Lab Reporting - 100µl of 25000µl Extract analyzed. Sample was 16.9g of 10.98 % solids sample -5mL Purge

Response Benzene = 1018563 IS Resp = 55180 @ 50µg/L

RRF Benzene = 22.946

∴

$$\text{Conc} = \frac{1018563 \times 50}{55180 \times 22.946} \times \frac{25000}{100} \times \frac{5}{(16.9 \times .1098)} = 27093 \mu g/kg$$ ✓

Using Sample water as also being part of the extract -

16.9g × (1 − 0.1098) = 15.04mL

∴ Total Extract = 25000µl MeOH + 15040µl Water = 40040

Re-calc.

$$\therefore \text{Benzene Conc} = \frac{1018563 \times 50}{55180 \times 22.948} \times \frac{40040}{100} \times \frac{5}{(16.9 \times .1098)} = 43392 \mu g/kg$$

= 43000µg/kg

SD-5~~E~~DUPE (NOR) Benzene - 18.5g of 9.99 % solids Sample ⇒ Water = 16652µl

∴ Total Volume Extract = 25000µl + 16652µl = 41652µl

Recalc.

$$\therefore \text{Benzene Conc} = \text{Report Conc.} \times \frac{41652}{25000}$$

$$= 28779 \times \frac{41652}{25000} = 47948 \mu g/kg$$

= 48000µg/kg

∴ For the Benzene results for SD-5 and SD-5DUP, the values 43000µg/kg and 48000µg/kg, respectively, will be associated with these samples.

11. Field Duplicate Precision

Field duplicate samples are reviewed to assess representativeness of the sample aliquot to the area sampled and the precision of the results relative to field sampling techniques.

Review analytical results for the duplicate sample analyses.

Action: If field duplicate precision exceeded 30% RPD for aqueous samples or 50% RPD for sediment samples for any compound, estimate (J and UJ) positive and non-detect results for the affected compounds in both samples. If severe imprecision was noted in the field duplicate sample (i.e., RPD >100%), qualify the remainder of the associated field sample data based on sound technical judgment.

Comments:

Field Duplicate Samples: SD-5 SD-5DUP

See page 12A-VOA where FD precision between detected results for SD-5 and SD-5DUP calculated.
For those compounds showing RPD >50%, the results have been qualified as estimated (J) for the SD-5 and SD-5DUP samples.

In general, field duplicate precision objectives were not met for the volatile sample analyses.

Analyte	SD-5 42563-2 µg/Kg	SD-5 Sample Result RL = 16 ug/kg	SD-5DUP 42563-4 µg/Kg	SD-5DUP Sample Result RL = 16 ug/kg	RPD	Action
Vinyl chloride	17	< RL	ND		NA	No Action
Acetone	2400	> 2 x RL	2100	> 2 x RL	13.3	No Action
Carbon disulfide	63	> 2 x RL	56	> 2 x RL	11.8	No Action
2-Butanone (MEK)	540	> 2 x RL	490	> 2 x RL	9.7	No Action
cis-1,2-Dichloroethene	54	> 2 x RL	17	>RL but <2 x RL	104.2	J Both
Benzene	43000	> 2 x RL	48000	> 2 x RL	11.0	No Action
Trichloroethene	22	>RL but <2 x RL	10	< RL	75.0	J SD-5
Toluene	140	> 2 x RL	45	> 2 x RL	102.7	J Both
Chlorobenzene	37	> 2 x RL	15	< RL	84.6	J SD-5
Ethylbenzene	710	> 2 x RL	280	> 2 x RL	86.9	J Both
p/m-Xylene	3400	> 2 x RL	1400	> 2 x RL	83.3	J Both
o-Xylene	370	> 2 x RL	220	> 2 x RL	50.8	J Both

12. Additional QA/QC Issues

Were the percent solids for the samples >30%. Yes No NA.

The sampling for volatile sediment samples was modified from Method 5035 in an attempt to appropriately deal with sediments with very low solids content (<30%). As such, the low-level preservation technique required sampling approximately 5g of sediment and placing the sample under 5mL of water (method 5035 suggests a 1:2 ratio of soil to water). The medium- or high-level preservation technique also required 1:1 methanol to sample preservation. Therefore, while Region I data validation guidelines require that data be estimated (J) and/or rejected (R) based on low %solids content of the samples, no action was taken to qualify sediment sample results based on solids content for this project.

List any additional issues which may affect the quality of the results. List the affected samples, QA/QC issue, and necessary actions taken in the comments section below.

All samples had % solids <30% - % solids measured were:

Sample ID	% Solids	Sample ID	% Solids
SD04	13.22	SD-11	14.68
SD12	13.76	SD-5	10.98
SD13	27.04	SD-5 DUP	9.99
SD 03	23.74	SD-9	7.19
SD-2	8.79	SD-8	17.04
SD-01	23.8	SD-7	10.29
SD-10	22.47	SD-6	18.36

No Action taken except to note % solids.

- Date of Collection incorrect in Database for several samples. The correct sample date was added to the DB file during this evaluation.

IVA. Example Sample Calculations

Review of one sample per data package is performed to determine if sample results and quantitation limits were correctly calculated and reported.

Sample ID: SD-5 was selected for review in this data package.

A. Form 1 Review

1. Were the Form 1s for completed according to the method/QAPP requirements? Yes / No. If no, list below the affected fields.

2. Reproduce the reporting limit for VOC in one of the samples, did the laboratory correctly calculate the quantitation limits? Yes / No. If no, list below.

$$2 \mu g/kg \times \frac{5}{(5.2 \times .1098)} \times 1 = 18 \mu g/kg$$

B. Quantitation Review

Reproduce a calculation for one volatile analyte in one of the samples that contained a positive result and compare the calculated result to the result reported by the laboratory.

Analyte Checked: Ethylbenzene

Laboratory Result: 710 µg/kg Calculated Result: 710 µg/kg ✓

Example Calculation: 5.2g, 10.98% solids, DF=1; 5mL purge

Ethylbenzene Response = 1625108 IS Resp = 526045 @ 50 µg/L

RRF ICAL = 1.931

$$Conc = \frac{1625108 \times 50}{526045 \times 1.931} \times \frac{5}{(5.2 \times 0.1098)} = 700.5 \mu g/kg$$

Actual weight, per Vial Log, was 5.15g - 5.2g on Form 1.

Using 5.15g gives

$$Conc = 707.3 \mu g/kg = 710 \mu g/kg$$

Lab used actual weights, not rounded values as shown on Form 1s.

Industri Plex 1999
SVOC - Sediments

IIIB. Review of Semivolatile Organic Data

1. Holding Times

Holding times and QC association with the samples are reviewed to ensure the accuracy of the reported results. The table on the following page (Table 1a) was completed to document the holding times and QC association.

Review the Semivolatile Organic Analysis Data Sheet.

Were the holding time requirements (surface waters extracted within 7 days; sediment and biota extracted within 14 days of sampling (or of thawing for biota) and extracts analyzed within 40 days of preparation) met for each sample? Yes / No. If no, list below the affected samples and the number of days outside of holding time.

Action: If the holding times were slightly exceeded, estimate (J and UJ) positive and non-detect results. If the holding times were grossly exceeded (more than twice the allowed holding time), professional judgment should be used to determine the action necessary. Evaluation of screening, undiluted and dilution analyses, if available, should be made to determine the impact of the holding time violation on the data quality (e.g., whether or not positive values are estimated (J) and whether non-detected values should be estimated (UJ) or rejected (R)).

Comments: See page 2-SVOC.

Samples were received at WHGEL and then shipped to subcontractor for freeze-drying. Lab extracted all freeze-dried samples within 14 days of sample collection. No Action Required.

Samples received 6/21/99 COC Temp = 7°C.
No Action - see pg 1-VOC

Table 1a. Holding Time and Associated QC Table

Sample Matrix: 14 Sediments + 1 MS/MSD

Sample ID	Date/Time Sampled	Field Blank	Method Blank	LCS		Date/Time Extracted	Date/Time Analyzed
SD04 (42537-1)	6/17/99 11:30	RB 6/17	MS070181	MS07016-3		7/01/99	7/15
SD12 (-4)	6/17 13:15						7/15
SD-13 (-6)	6/17 15:30	↓					7/15
SD-03 (42541-1)	6/18 11:30	RB 6/18					7/16
SD-03MS (-1MS)	6/18 12:00						7/16
SD-03MSD (-1MSD)	6/18 12:30	↓	↓	↓		↓	7/16
RB 6/17 (42547-2)	6/17 11:00	N/A	SW062381	SW06232L1	NCR	~~7/03/99~~ 6/23	7/08/99
RB 6/18 (42551-3)	6/18 14:30	N/A	SW062381	↓	10/11/99	~~7/09/99~~ 6/23	7/09/99
SD-2 (42562-1)	6/21	RB 6/21	MS070181	MS07016-3		7/01/99	7/15
SD-01 (-4)	6/21						7/15
SD-10 (6)	6/21						7/15
D-11 (-8)	6/21	↓	↓	↓		↓	7/15 + 7/16
RB 6/21 (-3)	6/21	N/A	SW062881	SW0628L1		~~7/02/99~~ 6/28/99 NCR	7/09/99
SD-5 (42563-1)	6/22	RB 6/22	MS070181	MS07016-3		7/01/99	7/15
SD-5DUP (42563-3)	6/22						7/15
SD-9 (-5)	6/22						7/15
SD-8 (-7)	6/22	↓					7/15
SD-7 (-10)	6/23	RB 6/23					7/15 + 7/16
SD-6 (-12)	6/23	↓	↓	↓		↓	7/15 + 7/16
RB 6/22 (-9)	6/22	N/A	SW062881	SW06284		6/28/99	7/09/99
RB 6/23 (-14)	6/23	N/A	↓	↓		↓	7/09/99

* RB Data submitted with Surface Water SDG

2. GC/MS Instrument Performance Check

The DFTPP instrument performance checks (tunes) are reviewed to assess the accuracy and sensitivity of the results relative to instrument performance.

Review the tune summaries for DFTPP

Were all Method 8270C defined mass calibration and ion abundance criteria met for the DFTPP analyses? Yes / No. If no, list below the tune and affected samples.

Review the raw data for one tune. Did the laboratory obtain the DFTPP mass spectrum in a straight-forward manner (e.g., average of three scans centered across the DFTPP peak with background subtraction from a scan within 20 scans prior to the DFTPP scan)? Yes / No. If no, list below the method used to obtain the mass spectrum and the affected samples.

Were all samples analyzed within 12 hours of an acceptable tune? Yes No If no, list below the affected samples.

Action: If the mass assignment criteria were not met (e.g., base peak assigned to m/z 199 instead of m/z 198), reject (R) all associated data. If the ion abundance criteria were not met, sound technical judgment should be used in evaluating whether or not the data require estimation (U and UJ) or rejection (R) (e.g., the criteria requirements for the m/z 198/199 and 442/443 ratios and relative abundances of m/z 68, 70, 197, and 441 are most important for proper tune while the relative abundances for m/z 51, 127 and 275 are of lesser importance.)

Comments:

Form 5's for DFTPP Summary show latest CLP SOW Tune Criteria. Lab Instrument Summary correctly reports 8270C criteria. All Tunes met 8270C criteria.

Sample SD-03 run 7/16/99 was 33 min outside of Tune time (i.e., 12 HRS 33 min since tune). The Sample was rerun at dilution (DF=2) on 7/16/99 within Tune Time. Results very comparable to SD-03 original DF=1 analysis => No action taken based on injection outside of 12 HR Tune.

4. Initial Calibration

The initial calibration data are reviewed to determine if the standards were compliant with the method protocols.

Review the Initial Calibration Data Summary. Check and recalculate the RRFs, $\overline{RRF}$ and %RSD for at least one polynuclear aromatic hydrocarbon (PAH) analyte across the ICAL. Does the RRF and %RSD check back to the raw data? **Yes / No**. Were the RRFs for all analytes in the standard all greater than or equal to 0.05? **Yes / No**

Were at least five concentration levels of each compound analyzed during the initial calibration? **Yes / No**
Were all calibration standards analyzed within 12 hours of DFTPP tune? **Yes / No**

Was the lowest initial calibration standard at a concentration equivalent to the sample-specific reporting limit? **Yes / No** - See page 4A-SVOC

Were retention times for each target analyte stable across the calibration (i.e., minimum drift)? **Yes / No**

Did the initial calibration meet %RSD criteria of ≤ 30% for all analytes (surrogates and targets) across the calibration range? **Yes / No.**

Did the initial calibrations meet %RSD criteria of ≤ 15% for target analytes and surrogates across the calibration range? **Yes / No.** If no, was a calibration curve used for quantitation of results and was the correlation coefficient for the curve ≥ 0.99? **Yes / No.** Was the curve forced through the origin? **Yes / No**
If no, list below all the affected samples.

Action: If the %RSD >30% and average RRF ≥0.05, qualify positive and non-detected results as estimated (J and UJ). If the %RSD >30% and average RRF < 0.05 estimate positive results (J) and rejecy non-detected results (R). If the %RSD ≤ 30% and average RRF < 0.05 estimate positive results (J) and reject non-detected results (R). Sound technical judgment should be used in qualification of the data. The results for each sample associated with ICAL should be evaluated to determine if a result reported would be impacted by the mis-calibration.

Comments:

ICAL Check: Compound Checked Chrysene

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Avg. RRF	%RSD
Concentration	2 µg/mL	5 ug/mL	10 µg/mL	15 ug/mL	20 ug/mL	40 ug/mL		
Response Cpd	675732	1749516	3241353	5056696	7851190	11905835		
Conc, IS	10 µg/mL	10	10	10	10	10		
Response IS	2776696	2888156	2666879	2814312	2703904	2516400		
RRF	1.217	1.2115	1.215	1.198	1.452	1.183	1.246	8.2

Additional Notes:

Hexachlorocyclopentadiene lowest ICAL standard was at 5 ng/mL which is equivalent to 670 ug/kg (dry weight) - QAPP Requested 170 ug/kg.
∴ Lab Reported Hexachlorocyclopentadiene as if the lowest ICAL were at 2 ng/mL instead of 5 ng/mL. Also, lab's RLs for 3-Nitroaniline was based on lowest ICAL of 5 ng/mL; however, lab did use 2 ng/mL as lowest standard and QAPP requested 3-Nitroaniline be reported down to 2 ng/mL.

* Action: All data for Hexachlorocyclopentadiene Raised to Correct RL and 3-Nitroaniline Lowered to Correct RL.

- Hexachlorocyclopentadiene %RSD = 33.0%
- 2,4-Dinitrophenol %RSD = 72.2%
- 4,6-Dinitro-2-methylphenol %RSD = 36.1%

All other analyte %RSD < 30%.

* Action: Results for Hexachlorocyclopentadiene, 2,4-Dinitrophenol and 4,6-Dinitro-2-methylphenol qualified as estimated (J or UJ) in all Samples. These three compounds were all non-detected for the Samples in this SDG. Also, for all three compounds the primary source of non-linearity was in the lowest calibration standard (i.e. less certainty in the RL).

page 4A-SVOC

5. Continuing Calibration Check

The continuing calibration data are reviewed to determine if the standards were contractually compliant.

Review the Continuing Calibrations and Summaries. Check and recalculate the RRF and %Difference (%D) for at least one of the PAH in one of the CCALs. Does the RRF and %D check back to the raw data? **Yes / No.** Were the RRFs for all analytes in the standard all ≥ 0.05? **Yes / No**

Was a continuing calibration check performed every 12 hours following tuning verification of the instrument? **Yes / No.** If no, list below all the affected samples.

Were the target analytes recovered within the expected retention time window based upon the initial calibration (i.e., drift of instrument was acceptable)? **Yes / No.**

Did the continuing calibrations meet 8270C criteria for verification of %D ≤ ±25%? **Yes / No.** If no, list below the outliers and the affected samples.

Action: If the %D > ± 25% and the CCAL RRF ≥ 0.05, estimate positive and non-detected results (J and UJ) for samples analyzed following this standard for the compound(s) that was outside of calibration. If the RRF <0.05, qualify positive results as estimated (J) and reject (R) non-detected results as unusable.

Comments:

CCAL 7/15/99

CCAL Check: Standard ID C071501.D : Compound Checked Fluoranthene

Responses	RRF	avg. RRF ICAL	% Difference
Cpd: 3830719	1.265	1.338	5.4 ✓
IS: 3027443			

– CCAL 7/9/99 (RBs) - OK except 2,4-Dinitrophenol %D = 25.6% - No Action taken for Sample Data

– CCAL 7/15/99 Bis(2-chloroisopropyl)ether %D = 45.7% ; N-Nitroso-di-n-propylamine %D = 27.5% ; Hexachlorocyclopentadiene %D = 34.9% , 4-Nitrophenol %D = -45.9% * Action: All results for 4 compounds listed above in all samples analyzed on 7/15/99 (all samples! see page 2-SVOC) have been qualified as estimated (~~J &~~ all non-detects UJ as appropriate). Level of detection uncertain due to CCAL out of control limits. JJC 12/8/99

– CCAL 7/16/99 (Secondary dilution Runs for Samples) - Bis(2-chloroethyl)ether 27.4%D ; Bis(2-chloroisopropyl)ether - 51.0%D ; N-Nitroso-~~dimethylamine~~ Nea di-n-propylamine 27.6%D ; Hexachlorobutadiene -25.9%D ;

Continued on next page

Additional Notes:

2,4-Dinitrophenol -48.5%D ; 4-Nitrophenol -56.3%D.
The samples analyzed following this CCAL were
SD-03E , SD-03MS, SD-03MSD, SD-11E , SD-7E +
SD-6E where the "E" suffix denotes a secondary
dilution analysis for the sample since the original
analysis reported certain targets above calibration
range. These secondary dilution analyses will only
be used to report Analyte Results which were
above range on the original run (e.g. SD-03, Fluoranthene
was above range in the DF=1 run; and in SD-03E (DF=2)
Fluoranthene was in range so this reported value will
be associated with Fluoranthene for SD-03).
Since none of the Dilution analyses will be used to report
data for the CCAL compounds with %D ≥ ±25%, no
action was taken based on the CCAL of 7/16/99.

5. Laboratory and Field Blank Results

Laboratory and field blank results are reviewed to assess the presence of contaminants, which affect the accuracy and sensitivity of the results. See Table 1a. where the Holding Time and Associated QC Table was completed for the samples within this SDG.

Was each sample analysis associated with the appropriate method blank, *ie*., correct matrix, correct matrix level, same extraction batch? **Yes / No**. If no, list below affected samples.

Review the reporting forms for each method and field blank. Were any target compounds in the method blanks detected at concentrations above the Reporting Limit (RL)? Yes / No. If yes, were these compounds phthalates and were they reported at < 5 times the RL? Yes / No NCL 10/6/99
NCL 10/6/99

Action: - Blanks should not contain contaminants above the RL except for phthalates that must not be present above 5 times the RL. The Blank Action Level is defined as five times the highest level seen in any of the matrix-matched blanks associated with this SDG, except if phthalates are present, in which case the Blank action is ten times the highest level observed in any matrix-matched blank. The following actions should be taken if conditions warrant :

5. If the blank is not matrix matched, qualify all sample data, for the contaminant associated with this blank, with BB or EB, as appropriate.
6. If the reported result in a sample is below the reporting limit (sample < RL) and if a matrix-matched blank contains a result above the quantitation limit (blank > RL), the result in the sample should be negated (U) and raised to the sample-specific RL for that sample
7. If the sample result is between the reporting limit and the blank Action Level (RL < sample < Action Level), the result for the sample is negated (U) at the level found in the sample. Based on the level of contamination suspected in the sample, the reporting limit may be elevated. Professional judgment will be used in assessing the action needed.
8. If the sample result is greater than the RL and the blank Action Level, no action is taken.

Comments: 5 sediment rinsate blanks associated:
Blanks evaluated: RB 6/17, RB 6/18, RB 6/21, RB 6/22 + RB 6/23; MB MS0701B1

Highest Blank: - See page 6A-SVOC.
Action taken:
No Blank Action Required

Sample ID	Compound	Reported Result		Result based on Blank Action

Additional Notes: RBs reported in Surface water SDG.

RB 6/17 - All ND except Di-n-butylphthalate at 6 µg/L

RB 6/18 - All ND

RB 6/21 - All ND

RB 6/22 - All ND except Di-n-butylphthalate at 24 µg/L

RB 6/23 - All ND except Di-n-butylphthalate at 2 J µg/L

Di-n-butylphthalate was not detected in any of the field sediment samples therefore, no qualification of the data required.

MS0701B1 - No Analytes Detected

6. Surrogate Spike Recoveries

The surrogate spike recoveries are reviewed to assess the accuracy of the results relative to laboratory performance and specific sample matrix.

Review the Surrogate Recovery information for each field and quality control sample. For one sample, verify that the recoveries reported correspond to the raw data and that the recovery calculation was done properly. Were the recovery data reported properly? Yes / No.

Were the surrogate recoveries within QAPP defined and method-generated accuracy limits? Yes / No. If no, were the affected samples reanalyzed? Yes / No List below the affected samples.

Action - If two Base/Neutral (BN) or two Acid surrogate recoveries exceed the upper limit, estimate (J) positive results (for the fraction affected) due to a potential high bias of the results; no action is required for non-detect results. If two BN or 2 Acid surrogate recoveries are below lower accuracy limit but above 10% recovery, estimate (J and UJ) the positive and non-detect results, for the affected fraction, due to a potential low bias in the results. If any surrogate recoveries are below 10%, reject (R) non-detect results and estimate positive results (J) due to potential false negatives and low bias in the results, respectively.. List below the affected samples and required actions.

Comments: Due to Limited sample size after freeze-drying, the extraction for Semivolatiles, Pesticides + PCBs were done together. Since the acid SVOC surrogates would have interfered with the Pesticide analysis, these weren't added - only BN Surrogates Used.
All Surrogates within criteria except 2-Fluorobiphenyl in SD-5DUP which was recovered above criteria (149% Compared to 30-115% criteria). Since other two BN Surrogates were OK, no action taken. Lab narrative also indicates that elevated Surrogate recovery in sample may be due to the fact that sample was run at a dilution (DF=4)
- Surrogate - 10 µg/mL Conc. - 1mL Spiked - sample final volume = 4 mL => On-column Conc. for Surrogates = 2.5 µg/mL ✓

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

The matrix spike/matrix spike duplicate (MS/MSD) recoveries are reviewed to assess the accuracy of the results relative to the specific sample matrix and the relative percent differences (RPDs) are reviewed to assess the precision of the results relative to the specific sample matrix.

Review the unspiked sample, Matrix Spike, and Matrix Spike Duplicate (MS/MSD) raw data and recovery results. Were the recoveries for the MS/MSD calculated properly? **Yes / No.**

Did the laboratory perform MS/MSDs for each matrix and matrix level analyzed for each analytical batch prepared for analysis? **Yes / No.** If no, list below the affected samples.

Were the MS/MSD recoveries and precision within QAPP and method-generated accuracy limits? **Yes / No.** Were the RPDs between the MS/MSD within the QAPP precision criteria? **Yes / No.** If no, list below the affected compounds.

Was the %RSD for non-spiked compounds in the unspiked sample, MS and MSD ≤ 50%? **Yes / No / NA**

Action: No action is taken to the entire data set based on MS/MSD results alone. The unspiked sample may be qualified based on MS/MSD results as follows: if the MS/MSD recoveries were greater than the upper accuracy limit, estimate (J) positive results due to potential high bias; no action is required for non-detect results; if the MS/MSD recoveries were below the lower accuracy limit but above 10%, estimate (J and UJ) positive and non-detect results due to potential low bias; if a MS/MSD compound was recovered below 10% or not at all, estimate (J) positive results due to potential low bias and evaluate the non-detected results to determine whether estimation (UJ) or rejection (R) of the unspiked sample data is warranted. If the RPD between the MS and MSD > QAPP criteria, estimate (J and UJ) positive and non-detected results in the unspiked sample. If the %RSD, for a non-spiked compound, between the unspiked sample, MS, and MSD >50%, estimate (J) positive results and use professional judgement to qualify other detected and non-detected analytes.

Comments:

SD-03 MS + MSD done. In MS, 4-Nitrophenol %Rec = 140% (criteria = 11-114%) however MSD %Rec for 4-Nitrophenol was acceptable. SD-03 didn't report 4-Nitrophenol therefore no action taken based on high Recovery in MS.

- Acenaphthene in MS %Rec = 71% (OK), MSD = 55% (OK) with RPD = 25% (criteria for RPD = 19%) - Action: Result for Acenaphthene in SD-03 qualified as estimated (J) due to imprecision.

- Pyrene - Sample reported 6100 ug/kg and spike level was >12 times lower than level in unspiked sample (i.e. not appropriate). %Rec MS = 250 MSD %Rec = 0% + RPD = 200% - No Action taken to qualify Pyrene result since, based on professional judgment, the spike level wasn't appropriate for evaluation.

8. Laboratory Control Sample and Standard Reference Material Analysis

The Laboratory Control Samples (LCS) and/or Standard Reference Material (SRM) are reviewed to assess the accuracy of the results relative to the analytical procedure.

Review the raw data and recovery information for the LCS/SRM .

Did the laboratory perform a LCS or SRM for each matrix and matrix level analyzed? Yes / No. If no, list below the affected samples.

Were the LCS or SRM recoveries within QAPP and method-generated accuracy requirements for recovery? Yes / No. If no, list below the affected compounds.

Action: . If the LCS or SRM recoveries are above criteria, estimate (J) positive results due to potential high bias, no qualification of non-detected results is necessary. If the LCS or SRM recoveries are between 10% to the lower recovery limit, estimate (J and UJ) positive and non-detect results for the samples associated with the analytical batch due to potential low bias in the results. If the recovery in the LCS or SRM is less than 10%, estimate (J) positive results due to low bias and reject (R) non-detect results due to potential false negatives.

Comments:

- LCS-MS070163 - All OK except Pentachlorophenol at 0% Rec
- SRM 1941a (Organics in Marine Sediment) also analyzed. Recovery of detected (analyzed for and > ~0.1 x RL) was between 35% - 78% recovery of target PAHs.
- Lab asked, on 10/8/99 to review Pentachlorophenol in LCS - manual evaluation indicated that indeed this compound wasn't recovered. It should be noted that Pentachlorophenol in MS + MSD was recovered within criteria. Lab indicated that this analyte has shown recovery issues in Blank matrices but is OK in MS/MSDs (actual matrices).

* Action: Based on professional judgment, since other acidic analytes were recovered within criteria and since MS/MSD for Pentachlorophenol was acceptable, the result for Pentachlorophenol in all samples has been qualified as estimated (UJ) based on poor recovery of this analyte in the LCS. Potential low bias in data. [initials] 12/7/99

9. Internal Standards

The Internal Standard (IS) response in the samples and standards is evaluated to ensure that the analytical system was in control during analysis.

Were the IS areas for each sample and standard analyzed within -50 to + 100% of the continuing calibration? Yes/No. Were the retention times for the IS within ±30 seconds from the retention time established in the continuing calibration? Yes/ No.

Action: If an IS area is greater than +100% compared to the continuing calibration, qualify positive results as estimated (J), non-detects do not require action. If the IS area is below -50% but not lower than –80%, estimate positive and non-detected results (U and UJ). If the area drop off or retention time shift for the IS is too severe (>-80%), non-detected results may require rejection (R). Professional judgment must be used in evaluating the data associated with poor IS performance.

Comments:

All IS' were within criteria - no action required
(Note Form 8's - Lab incorrectly put Upper Limit for RT in Lower Limit spot on form + vice versa - documentation error).

10. Sample Quantitation Limits

Review raw data and reporting forms. Did the sample-specific RLs meet the QAPP criteria? Yes/No. Did the laboratory accurately adjust sample reporting limits to account for sample specific preparation and analysis conditions? Yes/No.

Were all components reported in the samples quantitated within the calibration region of the instrument for the detected analytes? Yes/No Were the relative retention times for all components reported within the retention time windows established during initial calibration? Yes/No

If the sample analyses were performed at dilutions, were more concentrated analyses performed or was sample screening information included in the data package? Yes/No.

Were sample dilutions appropriate relative to scaling of the chromatograms and the calibration levels employed (e.g, peaks of interest within upper half of the chromatogram and quantitation done within the calibration range)? Yes/No.

Action - If the quantitation limits for non-detect results are lower than the lowest calibration standard, or if a positive result is detected outside of the calibration range, estimate positive and non-detected results (J and UJ).

Comments:

- Due to Limited Sample size, the Pesticide + SVOC extraction was done together. The overall analysis scheme was:

30g → 4mL extract → 2mL Archived
→ 2mL GPC → 2mL extract → 1mL 8270C Analysis
→ 1mL 8081A/8082 Cleanup

Therefore, the SVOC fraction was equivalent to 30g sample being extracted to a final volume of 4mL (as reported on the Form 1s)
The QAPP requested ~170 ug/kg, assuming 100% solids, for SVOCs; however, lab was only able to report down to 270 ug/kg (assuming 100% solids)

- Several samples were analyzed at no dilution and at a secondary dilution since some compounds were above range in the undiluted extract. In these instances, the dilution result would be used for the sample value (i.e. replace result in undiluted sample) for the over-range compounds

11. Field Duplicate Precision

Field duplicate samples are reviewed to assess representativeness of the sample aliquot to the area sampled and the precision of the results relative to field sampling techniques.

Review analytical results for the duplicate sample analyses.

Action: If field duplicate precision exceeded 30% RPD for aqueous samples or 50% RPD for sediment or biota samples for any compound, estimate (J and UJ) positive and non-detect results for the affected compounds in both samples. If severe imprecision was noted in the field duplicate sample (i.e., RPD >100%), qualify the remainder of the associated field sample data based on sound technical judgment.

Comments:

Field Duplicate Samples: SD -5 SD -5 (Dup)

- See page 12A-SVOC where Precision Evaluation made for these samples. Precision objective of RPD ≤ 50% generally not met. It should be noted that:

1) % solids SD-5 = 97.31% while SD-5(Dup) = 55.07%
2) SD-5 analyzed at no dilution; SD-5(Dup) Analyzed at 1:4
3) The "raw" on-column concentrations for SD-5 and SD-5(Dup) show good comparability.
4) Only 10g of SD-5 available for extraction (SD-5(Dup) was ~30g ext.)

Therefore, it appears as though precision compromised due to matrix-related variability, sampling variability and/or due to freeze-drying variability.

*Actions taken as noted on page 12A-SVOC. No further action was taken on results where both samples reported concentrations less than the Reporting Limit (already flagged J, estimated) even though RPD > 50%. [initials] 12/7/99

- Several Dates Sampled were incorrect on the excel Datatables - these dates were corrected during this assessment.

Field Duplicate Precision Evaluation

Analyte	SD-5 42563-1 µg/Kg	SD-5 Sample Result RL = 810 ug/kg	SD-5 (Dup) 42563-3 µg/Kg	SD-5(Dup) Sample Result RL = 1900 ug/kg	RPD	Action
Phenol	340	< RL	760	< RL	76.4	No Action
Naphthalene	550	< RL	1100	< RL	66.7	No Action
Acenaphthene	390	< RL	1200	< RL	101.9	No Action
Fluorene	680	< RL	2000	>RL but <2 x RL	98.5	J SD-5(Dup)
Phenanthrene	5900	> 2 x RL	15000	> 2 x RL	87.1	J Both
Anthracene	640	< RL	1800	< RL	95.1	No Action
Fluoranthene	12000	> 2 x RL	26000	> 2 x RL	73.7	J Both
Pyrene	7900	> 2 x RL	19000	> 2 x RL	82.5	J Both
Benzo[a]anthracene	3100	> 2 x RL	6600	> 2 x RL	72.2	J Both
Chrysene	6500	> 2 x RL	14000	> 2 x RL	73.2	J Both
bis(2-Ethylhexyl)phthalate	3700	> 2 x RL	4500	> 2 x RL	19.5	No Action
Benzo[b]fluoranthene	6400	> 2 x RL	14000	> 2 x RL	74.5	J Both
Benzo[k]fluoranthene	5600	> 2 x RL	11000	> 2 x RL	65.1	J Both
Benzo[a]pyrene	3700	> 2 x RL	8300	> 2 x RL	86.2	J Both
Indeno[1,2,3-cd]pyrene	3100	> 2 x RL	7300	> 2 x RL	80.8	J Both
Dibenz[a,h]anthracene	670	< RL	1500	< RL	76.5	No Action
Benzo[g,h,i]perylene	2300	> 2 x RL	5900	> 2 x RL	87.8	J Both
2-Methylphenol	230	< RL	530	< RL	78.9	No Action
Dibenzofuran	460	< RL	1200	< RL	89.2	No Action
Carbazole	1100	>RL but <2 x RL	3100	>RL but <2 x RL	95.2	J Both

SD-5 already "J" due to uncertainty in reporting between MDL and RL

AWC 12/7/99

already "J" because ≤ RL.

page 12A-SVOC

12. Additional QA/QC Issues

Were the percent solids for the samples >30%. Yes / No / NA.

List any additional issues which may affect the quality of the results. List the affected samples, QA/QC issue, and necessary actions taken in the comments section below.

Action: If the %solids were between 10% and 30%, qualify positive results as estimated (J) and reject non-detected results (R). If the %solids were < 10%, reject (R) positive and non-detected results.

Note: Freeze-drying dramatically improved % solids contents of these samples (VOA, un-freeze-dried aliquots were all <30% solids while all SVOCs were 41-97% solids).

- Sample 42563-1 (SD-5) - Only 10.1 g available for extraction after freeze-drying. Also Sample 42562-1 (SD-2) was dropped during original extraction set-up so only 8.36 g available to actually extract.
- Sample SD-3, SD-11, SD-7 + SD-6 original runs had some components reported above calibration range. Samples reran at dilutions (runs shown as "E" analyses). During data assessment, the original and dilution analyses were compared and all showed good comparability for all detected analytes; therefore, in the database, the results associated with these samples are all from the original undiluted analysis except for those analytes above calibration range which were "replaced" with the value determined in the dilution analysis - For example: SD-7 reported only Fluoranthene above range (all other analytes within range) at 9600 E, SD-07E (1/2 Dilution) reported Fluoranthene at 8300 D - In the database, results for SD-7 are from 1:1 Analysis except for Fluoranthene which was reported from the SD-7E value

IVB. Example Sample Calculations

Review of one sample per data package is performed to determine if sample results and quantitation limits were correctly calculated and reported.

Sample ID: SD-03 was selected for review in this data package.

A. Form 1 Review

1. Were the Form 1s for completed according to the method/QAPP requirements? **Yes** / **No.** If no, list below the affected fields.

2. Reproduce the reporting limit for SVOC in one of the samples, did the laboratory correctly calculate the quantitation limits? **Yes** / **No.** If no, list below.

RL: $2 ng/mL \times \frac{1000 \times 4}{30.3 \times .7774} = 340\ \mu g/kg$ ✓

C. Quantitation Review

Reproduce a calculation for one semivolatile analyte in one of the samples that contained a positive result and compare the calculated result to the result reported by the laboratory.

Analyte Checked: Benzo(a)pyrene

Laboratory Result: 3300 µg/kg Calculated Result: 3300 µg/kg

Example Calculation: 30.3g extracted to 4mL; 77.74% solids; DF = 1

Response Benzo(a)pyrene = 3284847 IS Resp = 1267511 @ 10 µg/mL

RRF = 1.328

$$C_{mc} = \frac{3284847 \times 10}{1267511 \times 1.328} \times \frac{1000 \times 4}{(30.3 \times .7774)} = 3314\ \mu g/kg$$

$= 3300\ \mu g/kg$ ✓

Industriplex - 1999
Pesticides + PCBs - Sediment

IIIC. Review of Data

1. Holding Times

Holding times and QC association with the samples are reviewed to ensure the accuracy of the reported results. The table on the following page (Table 1a) was completed to document the holding times and QC association.

Review the Pesticide and Aroclor Data Sheets.

Were the holding time requirements (surface waters extracted within 7 days; sediment and biota extracted within 14 days of sampling (or thawing for biota) and extracts analyzed within 40 days of preparation) met for each sample? Yes / **No**. If no, list below the affected samples and the number of days outside of holding time.

Action: If the holding times were slightly exceeded, estimate (J and UJ) positive and non-detect results. If the holding times were grossly exceeded (more than twice the allowed holding time), professional judgment should be used to determine the action necessary. Evaluation of screening, undiluted and dilution analyses, if available, should be made to determine the impact of the holding time violation on the data quality (e.g., whether or not positive values are estimated (J) and whether non-detected values should be estimated (UJ) or rejected (R)).

Comments:

No Action Required - all HTs met.

Temp 7°C recorded on COC for 6/21/99.
No Action - see pg 1 - VOC.

Table 1a. Holding Time and Associated QC Table

Sample Matrix: 14 Sediments + 1 ms/msD

Sample ID	Date/Time Sampled	Field Blank	Method Blank	LCS		Date/Time Extracted	Date/Time Analyzed
SD04 (42537-1)	6/17/99 11:10	RB 6/17	MS070181	MS0701L1 MS0701L2		7/1/99	7/21/99
SD12 (-4)	6/17 13:18						7/21/99
SD-13 (-6)	6/17 15:30	↓					7/21/99
SD-03 (-1) 42541	6/18 11:30	RB 6/18					7/24/99 + 7/27/99
SD-03 ms (-1ms)	6/18 12:10						7/24/99
SD-03 msD (-1msD)	6/18 12:30	↓	↓	↓		↓	↓
Rinsate Blk 6/17 (42547-2)	6/17 11:00	N/A	PW062381	LW0623L1 LW0623L2		6/23/99	7/15/99
Rinsate Blk 6/18 (42551-3)	6/18 14:30	N/A	↓	↓		↓	↓
SD-2 (42562-1)	6/21	RB 6/21	MS070181	MS0901L1 MS0701L2		7/1/99	7/22/99
SD-01 (-4)	6/21						7/22 + 7/27/99
SD-10 (-6)	6/21						7/22/99
SD-11 (-8)	6/21	↓	↓	↓		↓	7/22/99
3 6/21 (-3)	6/21	N/A	PW0625B1	LW0625L1 LW0625L2		6/25/99	7/17/99
SD-5 (42563-1)	6/22	RB 6/22	MS070181	MS0701L1 MS0701L2		7/1/99	7/22/99
SD-5 DUP (-3)	6/22						7/22/99
SD-9 (-5)	6/22						7/24/99
SD-8 (-7)	6/22	↓					7/24/99
SD-7 (-10)	6/23	RB 6/23					7/24/99
SD-6 (-12)	6/23	↓	↓	↓		↓	7/29/99 + 7/24/99
RB 6/22 (-9)	6/22	N/A	PW0625B1	LW0625L1 LW0625L2		6/25/99	7/17/99
RB 6/23 (-14)	6/23	N/A	↓	↓		↓	↓

* RB Data submitted with Surface Water SDG

2. GC/ECD Instrument Performance Check

The instrument performance check, called Performance Evaluation Mixture (PEM) is analyzed to ensure the accuracy and sensitivity of the results relative to instrument performance.

Review the PEMs for the Pesticides.

Was the degradation of 4,4'-DDT to 4,4'-DDE and 4,4'-DDD <15% and was the degradation of Endrin to Endrin aldehyde and Endrin ketone < 15%? Yes / No. Were all compounds in the PEM 90% resolved on each GC Column? Yes / No If no, list below the affected samples.

Was a PEM analyzed daily or every 12 hours o instrument use? Yes / No. If no, list below the affected samples.

Action: If resolution of the PEM compounds is not acceptable (on one or both columns) professional judgment must be used in qualifying data. For example, if resolution is poor on both columns for two analytes, and if a sample reports one or both of these analytes as detected, the positive results should be qualified as estimated (J) due to uncertainty in quantitation and possibly in qualitative identification. If the breakdown for DDT and/or Endrin exceeds 15%, qualify all positive results for these compounds as estimated (J). If these two compounds are not detected, but their breakdown products are detected, qualify the DDT and/or Endrin non-detect result as rejected (R) and qualify the breakdown products as estimated (J).

Comments:

PEM's all ok - no action required.

5. Initial Calibration

The initial calibration data are reviewed to determine if the standards were compliant with the method protocols.

Review the Initial Calibration Data Summary for Pesticides and PCBs. Were linear (RRFs or CFs) statistics or calibration curves used in the initial calibration? **Linear / Curve?** If linear calibration, check and recalculate at least one pesticide compound and one peak for an Arochlor across the ICAL. Does the RRF and %RSD check back to the raw data? **Yes / No.** Did the initial calibration meet %RSD criteria of $\leq$ 30% for all analytes (surrogates and targets) across the calibration range? **Yes / No.** If no, was the average %RSD for all analytes in the calibration $\leq$ 30%? **Yes / No.** Were the RRFs for all analytes in the standard all greater than or equal to 0.05? **Yes / No** - Not applicable - curves used

If curve statistics were used for the initial calibration, was the regression coefficient > 0.99? **Yes / No.** Were the curves generated with sufficient points (linear with 5 points, quadratic with 6) **Yes / No.** Was the curve forced through the origin? **Yes / No** If yes, resubmittal of calibrations and samples must be requested to correct this non-compliance issue. L Reprocessed data all QC. Resubmittal Requested 9/24/99

Was the lowest initial calibration standard at a concentration equivalent to the sample-specific reporting limit? **Yes / No**

Were retention times for each target analyte stable across the calibration (i.e., minimum drift)? **Yes / No**

Action: If the %RSD >30% and average RRF $\geq$0.05, qualify positive and non-detected results as estimated (J and UJ). If the %RSD >30% and average RRF < 0.05 estimate positive results (J) and rejecy non-detected results (R). If the %RSD $\leq$ 30% and average RRF < 0.05 estimate positive results (J) and reject non-detected results (R). If the regression coefficient < 0.99, qualify positive and non-detected results as estimated (J and UJ). Sound technical judgment should be used in qualification of the data. The results for each sample associated with ICAL should be evaluated to determine if a result reported would be impacted by the mis-calibration. For curve analysis, if the percent Difference (%D) between the calculated area and the reported area > ±25%, qualify positive and non-detected results as estimated (J and UJ).

Comments:

Linear Pesticide ICAL Check: Compound Checked ______________________________

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Avg. RRF	%RSD
Concentration								
Response Cpd								
Conc, IS								
Response IS								
RRF								

3. Initial Calibration – continued

Linear PCB ICAL Check: Compound/Peak Checked ______________________________

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Avg. RRF	%RSD
Concentration								
Response Cpd								
Conc, IS								
Response IS								
RRF								

If curve statistics are used, verification of the computer generated equation may be difficult across the ICAL. Instead, a check is made for one pesticide and one PCB peak to determine whether the equation matches the data obtained as follows:

Curve equation: $y = a + bx + cx^2 + dx^3$

Where: $y = \dfrac{\text{Area compound}}{\text{Area Internal Standard}}$ or y = Area compound (external std. calibration)

$x = \dfrac{\text{Concentration Compound}}{\text{Concentration IS}}$ or x = Conc. compound (external std calibration)

Since solving for x is somewhat difficult, the system is checked by using the Calculated Compound Concentration to solve for the Area of the compound as follows:

Pesticide Compound evaluated: 4,4'-DDD - Channel A

Standard evaluated: 8081 L4

ICAL calibration formula:

$$y = (0.007328) + (0.840948)x + (-0.010336)x^2 + 0x^3$$

$$r^2 = 0.999185$$

Amount Reported	Amount of IS	Calculated x	Calculated y	Area of IS	Calculated Area of compound	Reported Area of Compound
19.9568	50	0.3991	0.3413	94253	32172	35031
					%Difference	8.2% ✓

3. Initial Calibration – continued

PCB Peak evaluated: Aroclor 1016 peak # 3 -Channel B - 7/21/99 ICAL

Standard evaluated: 166OL4

ICAL calibration formula:

$$y = (1963.348543) + (140.610928)x + (-0.008285)x^2 + 0x^3$$

$r^2 = 0.999659$

Amount Reported	Amount of IS	Calculated x	Calculated y	Area of IS	Calculated Area of compound	Reported Area of Compound
302.1303	—	302.1303		—	43690	38703
					%Difference	-12.9%

1 Pest ICAL on 7/20/99 - 2 PCB ICALs - one on 7/21/99 + another on 7/23/99

- Resubmitted data for Pesticides ICALs, CCALs + Samples received 10/1/99 - Original data used Curves for Pesticides that were forced through the origin (see page 30 for Resubmittal request).

- Lab's lowest ICAL for Pest = ~~2~~ 5 ug/mL — RL based on 5 ug/mL (~~conservative~~) NC 10/22/99 final RL using 5 ug/mL meets QAPP RL ✓ Standards log shows 5 ug/mL lowest.

- Lowest ICAL std for PCBs = 20 ug/mL => RL = 20 × $\frac{4}{30}$ = 2.7 ✓ meets QAPP RL requirement.

6. Continuing Calibration Check

The continuing calibration data are reviewed to determine if the standards were contractually compliant.

Review the Continuing Calibrations (CCAL) and Summaries. If average RRFs or CFs are used, check and recalculate the RRF and %Difference (%D) for at least one of the Pesticides and one of the PCBs in one of the CCALs. Does the RRF or CF and %D check back to the raw data? **Yes / No** Were the RRFs for all analytes in the standard all ≥ 0.05? **Yes / No** - Not applicable - curves used

If curve statistic calibrations were used, check one of the CCALs for one Pesticide and one peak for a PCB to determine if the calibration relates properly back to the corresponding ICAL. Do the CCALs properly reference the correct ICALs? **Yes / No.**

Was a continuing calibration check performed every 12 hours following tuning verification of the instrument? **Yes / No.** If no, list below all the affected samples.

Were the target analytes recovered within the expected retention time window based upon the initial calibration (i.e., drift of instrument was acceptable)? **Yes / No.**

Did the continuing calibrations meet 8081A and 8082 criteria for verification of %D ≤ ±15% or %Drift ≤ ±15% for every compound? **Yes / No** Did the continuing calibrations meet 8081A and 8082 criteria for verification where the average of all compounds analyzed had %D ≤ ±15% or %Drift ≤ ±15% for every compound? **Yes / No** If no, list below the outliers and the affected samples.

Action: If the %D or %Drift for a compound > ±15%, estimate positive and non-detected results (J and UJ) for samples analyzed following this standard for the compound(s) that was outside of calibration.

Comments:

Linear CCAL Pesticide check:

CCAL Check: Standard ID ________________: Compound Checked ____________________________

Responses	RRF/CF	avg. RRF(CF) ICAL	% Difference
Cpd:			
IS:			

Linear CCAL PCB check:

CCAL Check: Standard ID ________________: PCB/peak Checked ____________________________

Responses	RRF/CF	avg. RRF(CF) ICAL	% Difference
Cpd:			
IS:			

4. Continuing Calibration Check - continued

If curve statistics are used, verification of the computer generated equation may be difficult across the ICAL. Instead, a check is made for one pesticide and one PCB peak to determine that the correct equations were used to generate the amount found in the CCAL standard

Curve equation: $y = a + bx + cx^2 + dx^3$

Where: $y = \frac{\text{Area compound}}{\text{Area Internal Standard}}$ or y = Area compound (external std. calibration)

$x = \frac{\text{Concentration Compound}}{\text{Concentration IS}}$ or x = Conc. compound (external std calibration)

Since solving for x is somewhat difficult, the system is checked by using the Calculated Compound Concentration to solve for the Area of the compound as follows:

Pesticide Compound evaluated: Aldrin

Standard evaluated: 72180812 -Channel B

ICAL calibration formula:

$$y = (-0.000259) + (1.208692)x + (-0.114803)x^2 + 0x^3$$

$$r^2 = 0.999197$$

Amount Reported	Amount of IS	Calculated x	Calculated y	Area of IS	Calculated Area of compound	Reported Area of Compound
18.3812	50	0.3676	0.4286	178436	76472	76473
					%Difference	0.001% ✓

Amount Found	Theoretical Amount	% Drift
18.3812	20	8.1% ✓

Lab convention for %D on Forms for CCAL = $\frac{\text{Amt Calc} - \text{True}}{\text{True}}$ - opposite std. convention. All %D Reference given below use the lab's convention as reported.

- Pest CCAL 72180811 - % Drift on Channel A + B all ≤ 15% - OK

Pest CCAL 72180812 - % Drift Channel A Tox = -17%; channel B = -12%

% Drift Endosulfan I on A = -9%; Channel B = -17%

No action taken since % Drift OK on one of the channels for each compound

4. Continuing Calibration Check - continued

PCB and Peak evaluated: AR1260 Peak #5

Standard evaluated: A9721601 - channel A

ICAL calibration formula:

$$y = (1944.307271) + (65.366606)x + (-0.001819)x^2 + 0x^3$$

$$r^2 = 0.99974$$

Amount Reported	Amount of IS	Calculated x	Calculated y	Area of IS	Calculated Area of compound	Reported Area of Compound
1000.8379	—	1000.8379	65544	—	65544	65544
					%Difference	0% ✓

Amount Found	Theoretical Amount	% Drift
1006.55	1000	-0.66%

- Pest CCAL 72380811 Endosulfan I channel A = -8%; channel B = -18% - No action taken since channel A OK
- Pest CCAL 72380813 - 11 channel A Compounds > 15% Drift, 3 channel B out Compounds out on both channels:

  Aldrin Channel A = -19%; Channel B = -16%

  Heptachlor Epoxide Channel A = -19%; Channel B = -17%

  This was an ending calibration standard (no samples analyzed after this) - since opening std (72380811) was OK - no action taken based on this non-compliant CCAL.
- Pest CCAL 72980811 DDT 21% Drift Channel A; 7% Channel B - OK

  Methoxychlor 20% Drift on A; 23% on B

  This CCAL run prior to Sample 42563-12 ~~(Dilution Run of SD-6 called SD-6E~~ NAE 10/20/99 - Sample SD-6 - Methoxychlor ND -

* Action: The non-detect result for methoxychlor in SD-6 has been qualified as estimated (UJ)

due to non-compliant CCAL for this analyte. ...

Additional Notes:

Pest CCAL 72980812 - 4,4'-DDT + methoxychlor %Drift > 15% on channels A + B - This was the ending sequence standard (no samples analyzed after this) ⇒ No action taken based on this non-compliant CCAL.

PCB CCAL A9721601 - All OK

PCB CCAL A9721602 - ending sequence CCAL - Ar1260 %Drift > 15% on Channels A + B (23% + 16%) - Prior CCAL OK ⇒ no action taken based on this non-compliant ending CCAL.

PCB CCAL A9723602 - TMX Channel A out; AR1260 Channel B out (22% Drift) - Since the other channel %Drift for these analytes was acceptable + since none of the samples associated with this CCAL reported positive detects for AR1260, no action taken.

PCB CCAL A9723603 - ending sequence CCAL - AR1016 Channel A = 32%; Channel B = 18%; AR1260 Channel A = 23%, Channel B = 34%. This ending CCAL indicates increased sensitivity to detection of AR1016 + AR1260 (%D convention reversed ⇒ + %Drift = increased sensitivity for Pest/PCB data). Since none of the samples in the sequence analyzed immediately prior to this standard reported positive results for ~~AR~~ *any* Aroclor, no action taken based on this non-compliant CCAL since instrument appeared more sensitive than during ICAL to the analytes of interest ⇒ the non-detected results are considered acceptable.

Note: For those CCALs that had analytes with %D > 15%, the sample data was checked to ensure that the reported result for an analyte was not reported off of a channel with a non-compliant CCAL (i.e, even if 1 channel OK but other not ⇒ no overall action taken the data was checked to make sure all values reported had the correct channel CCAL in compliance for the analyte reported).

9A - Pest/PCB

5. Laboratory and Field Blank Results

Laboratory and field blank results are reviewed to assess the presence of contaminants, which affect the accuracy and sensitivity of the results. See Table 1a. where the Holding Time and Associated QC Table was completed for the samples within this SDG.

Was each sample analysis associated with the appropriate method blank, *ie.*, correct matrix, correct matrix level, same extraction batch? **Yes / No**. If no, list below affected samples. Were Cleanup Blanks analyzed? **Yes / No/ NA.**

Blank data for cleanup not reported since method Blanks OK

Review the reporting forms for each method and field blank. Were any target compounds in the method blanks detected at concentrations above the Reporting Limit (RL)? **Yes / No.**

Action: - Blanks should not contain contaminants above the. The Blank Action Level is defined as five times the highest level seen in any of the matrix-matched blanks associated with this SDG. The following actions should be taken if conditions warrant :

9. If the blank is not matrix matched, qualify all sample data, for the contaminant associated with this blank, with BB or EB, as appropriate.
10. If the reported result in a sample is below the reporting limit (sample < RL) and if a matrix-matched blank contains a result above the quantitation limit (blank > RL), the result in the sample should be negated (U) and raised to the sample-specific RL for that sample
11. If the sample result is between the reporting limit and the blank Action Level (RL < sample < Action Level), the result for the sample is negated (U) at the level found in the sample. Based on the level of contamination suspected in the sample, the reporting limit may be elevated. Professional judgment will be used in assessing the action needed.
12. If the sample result is greater than the RL and the blank Action Level, no action is taken.

Comments:

Blanks evaluated: RB 6/17, RB 6/18, RB 6/21, RB 6/22, RB 6/23 + ~~MB~~ MS 070181 10/20/99

Highest Blank: ______

Action taken:

No Blank Action Required

Sample ID	Compound	Reported Result		Result based on Blank Action

6. Surrogate Spike Recoveries

The surrogate spike recoveries are reviewed to assess the accuracy of the results relative to laboratory performance and specific sample matrix.

Review the Surrogate Recovery information for each field and quality control sample. For one sample, verify that the recoveries reported correspond to the raw data and that the recovery calculation was done properly. Were the recovery data reported properly? Yes / No.

Were the surrogate recoveries within QAPP defined and method-generated accuracy limits? Yes / No. If no, were the affected samples reanalyzed? **Yes / No.** Did the chromatography of the affected samples show interferences? **Yes / No.** Was the retention time (RT) of the surrogates within criteria (Tetrachloro-m-xylene within ± 0.05 min and Decachlorobiphenyl ± 0.10 min from average RT of surrogate from ICAL)? Yes / **No.** List below the affected samples.

Action – Professional judgment must be used in qualifying data for Pesticides/PCBs based upon the surrogate recoveries. If recovery is outside of criteria on one column, but acceptable on the other, and all quantitative results are obtained for the samples on the second column, then qualification of the data may not be required. If quantitation is reported for a particular column, and surrogate recoveries are outside of criteria, the following actions may be taken: if 10% < %Rec < Lower Acceptance Limit, qualify detected and non-detected results as estimated (J and UJ); if %Rec > Upper Acceptance Limit estimate detected results (J), no action required for non-detects; if %Rec < 10%, estimate (J) positive results and reject (R) non-detects. A review of the data for both columns, comparing sample chromatograms to standard chromatograms, must be done and professional judgment must be used to determine if action is warranted. List below the affected samples and required actions.

Comments:

Several samples showed interferences on one or the other column - very complex matrices - lab used judgment in reporting surrogate recoveries using the following criteria -

Column A + Column B %RPD > 40% - lab generally chose highest value unless interference was observed. For those samples with RPD > 40%, lab Qualified Data using "P" or "I" - For all samples, "P" indicated that higher value was reported (opposite of CLP convention) - for surrogates, both % Rec checked + unless there was some interference (as Qualified as I by lab) all surrogates for both columns met QAPP criteria.

No Action Required

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

The matrix spike/matrix spike duplicate (MS/MSD) recoveries are reviewed to assess the accuracy of the results relative to the specific sample matrix and the relative percent differences (RPDs) are reviewed to assess the precision of the results relative to the specific sample matrix.

Review the unspiked sample, Matrix Spike, and Matrix Spike Duplicate (MS/MSD) raw data and recovery results. Were the recoveries for the MS/MSD calculated properly? Yes / No.

Did the laboratory perform MS/MSDs for each matrix and matrix level analyzed for each analytical batch prepared for analysis? Yes / No. If no, list below the affected samples. – Done on a per SDG basis

Were the MS/MSD recoveries and precision within QAPP and method-generated accuracy limits? Yes / No Were the RPDs between the MS/MSD within the QAPP precision criteria? Yes / No If no, list below the affected compounds.

Was the %RSD for non-spiked compounds in the unspiked sample, MS and MSD ≤ 50%? Yes / No / NA

Action: No action is taken to the entire data set based on MS/MSD results alone. The unspiked sample may be qualified based on MS/MSD results as follows: if the MS/MSD recoveries were greater than the upper accuracy limit, estimate (J) positive results due to potential high bias; no action is required for non-detect results; if the MS/MSD recoveries were below the lower accuracy limit but above 10%, estimate (J and UJ) positive and non-detect results due to potential low bias; if a MS/MSD compound was recovered below 10% or not at all, estimate (J) positive results due to potential low bias and evaluate the non-detected results to determine whether estimation (UJ) or rejection (R) of the unspiked sample data is warranted. If the RPD between the MS and MSD > QAPP criteria, estimate (J and UJ) positive and non-detected results in the unspiked sample. If the %RSD, for a non-spiked compound, between the unspiked sample, MS, and MSD >50%, estimate (J) positive results and use professional judgement to qualify other detected and non-detected analytes.

Comments: Since Pest/PCB single extraction done, only Pesticide MS used - 50-03 MS + MSD performed. Lab used QC charting limits for accuracy - limits reasonable, and in some cases the same, compared to QAPP limits. Lab contacted and it was learned that precision criteria (set by lab at ≤ 50%) was arbitrarily set ⇒ Assessment will be based on QAPP precision criteria.

MS % Rec All OK except Endrin - 38% Rec compared to 42-139% Criteria.

MSD % Rec All OK except Aldrin -30% Rec (35-130%) + 4,4'-DDT at 177% Rec (23-134% Criteria). RPD Aldrin = 44% (limit ≤ 43%); gamma-BHC RPD = 68% (limit ≤ 50%) + all other RPDs < QAPP Criteria.

continued on next page.

Additional Notes:

Only Spike Component detected in unspiked SD-03 Sample was 4,4'-DDT.

* Action: Results for the unspiked sample SD-03 have been qualified as estimated ~~J~~ NCR 10/22/99 or (UJ) for Endrin and Aldrin due to low recovery of the spike compounds in the MS or MSD (may be biased low) and for gamma-BHC due to precision objectives not being achieved. Precision was also not acceptable for the Aldrin determination. 12/7/99

* The result for 4,4'-DDT in SD-03 has been qualified as estimated (J) due to the high recovery in the MSD sample (i.e. accuracy issues) - the result for 4,4'-DDT in SD-03 may be biased high.

Sample SD 03 was analyzed at a DF=1 and then reanalyzed (as SD 03E) at a DF=10. The MS/MSD were analyzed once at DF=1 (using CLP convention). In the analysis of SD-03 at DF=1, alpha-chlordane was detected on Column A but interference existed so Area=0 - not picked up on Column B. During the DF=10 analysis, alpha-chlordane was detected on both Columns A+B and reported as a positive result. The GC pattern for Columns A+B for SD-03 MS + MSD are similar to the SD-03 DF=1 analysis - for MS + MSD α-Chlordane was Not detected. A comparison of unspiked results for SD-03, MS + MSD is as follows:

Results in ug/kg	SD-03	SD-03 MS	SD-03 MSD	% RSD	ACTION
α-chlordane	74	ND	ND	N/A	None
4,4'-DDE	43	53	29	28.9%	None
4,4'-DDD	86	120 E	47E	43.3%	None

No Action taken to qualify the unspiked analytes in SD-03 based on the comparison between SD-03 and the MS + MSD since 1) %RSD < 50% and 2) α-Chlordane result in SD 03 was based on a DF=10 analysis + since SD-03 MS + MSD were run at DF=1, the α-Chlordane was not detected.

8. Laboratory Control Sample and Standard Reference Material Analysis

The Laboratory Control Samples (LCS) and/or Standard Reference Material (SRM) are reviewed to assess the accuracy of the results relative to the analytical procedure.

Review the raw data and recovery information for the LCS/SRM .

Did the laboratory perform a LCS or SRM for each matrix and matrix level analyzed? Yes / No. If no, list below the affected samples.

Were the LCS or SRM recoveries within QAPP and method-generated accuracy requirements for recovery? Yes / No. If no, list below the affected compounds.

Action: . If the LCS or SRM recoveries are above criteria, estimate (J) positive results due to potential high bias, no qualification of non-detected results is necessary. If the LCS or SRM recoveries are between 10% to the lower recovery limit, estimate (J and UJ) positive and non-detect results for the samples associated with the analytical batch due to potential low bias in the results. If the recovery in the LCS or SRM is less than 10%, estimate (J) positive results due to low bias and reject (R) non-detect results due to potential false negatives.

Comments:

LCS MS070111 Results % Rec all within QAPP Criteria.

SRM 1941a MS090151 Analyzed - all SRM Pesticides detected - Summary of Recovery results as follows:

Compound	Found Result (ug/kg)	SRM Cert. Value	% Rec
α-chlordane	4.1	2.33 ± 0.56	176%
4,4'-DDE	6.0	6.59 ± 0.56	91%
4,4'-DDD	5.1	5.06 ± 0.58	101%

Action: Recovery of α-chlordane in SRM high ⇒ positive detected results for the samples in this batch reporting α-chlordane may also be biased high. Therefore positive detects qualified as estimated (J) - affects Samples SD-03, SD-01 and SD-06.

9. Pesticide Cleanup Checks

Where cleanup protocols used on the Pesticide/PCB extracts? Yes / No. If yes, what cleanups were used and what QC was generated to verify the adequacy of the cleanup:

Cleanup Protocol	QC Activities
GPC	
Amino-Propyl	Extra- Blank Run + All Batch QC

Were all samples and QC from the original extraction put through the cleanup protocols? Yes/No.
Were there any QC results which indicated that the cleanup was not adequate? Yes / No.

Action: If a QC sample, for example Method Blank or LCS, demonstrates unacceptable results (e.g., contamination or loss of analytes of interest), the data associated with these QC samples may require qualification based on professional judgment.

Comments:

QC samples (method Blanks, LCS, SRm) show no determental effect of GPC or Amino-propyl cleanup on results -
No Action required.

10. Sample Quantitation Limits

Review raw data and reporting forms. Did the sample-specific RLs meet the QAPP criteria? **Yes/No.** Did the laboratory accurately adjust sample reporting limits to account for sample specific preparation and analysis conditions? **Yes /No.**

Were all components reported in the samples quantitated within the calibration region of the instrument for the detected analytes? **Yes/No** Were the relative retention times for all components reported within the retention time windows established during initial calibration? **Yes/No**

Samples reanalyzed at Dilutions

If the sample analyses were performed at dilutions, were more concentrated analyses performed or was sample screening information included in the data package? **Yes/ No.** - Except for SD-6

Were sample dilutions appropriate relative to scaling of the chromatograms and the calibration levels employed (e.g, peaks of interest within upper half of the chromatogram and quantitation done within the calibration range)? **Yes /No.**

Action - If the quantitation limits for non-detect results are lower than the lowest calibration standard, or if a positive result is detected outside of the calibration range, estimate positive and non-detected results (J and UJ).

Comments: QAPP req. RL - Pest = 1.0 µg/kg ; PCB = 10 µg/kg
Lowest ICAL std Pest = 5 ng/mL ⇒ Pest RL.

Sample SD-2 Pest RL = 2.6 µg/kg + PCB RL = 10.4 µg/kg - This was due to the fact that the original sample was dropped so only 8.36 g remained for analysis (92% solids ⇒ RL = 5 ng/mL × $\frac{4}{8.36 \times .92}$ = 2.6 µg/kg)

Sample SD-5 Pest RL = 2.0 µg/kg since only 10.07 g was available for extraction.

SD-5 Dup Pest RL = 1.2 µg/kg - 30.13 g extracted but after freeze-drying the % solids = 55% ⇒ cause for higher RL.

SD-9 - 42% solids cause RL to raise to 1.6 µg/kg

SD-7 61% solids caused RL to raise to 1.1 µg/kg

SD-6 Required a dilution of 1/10 for analysis causing the RL to raise to 7.6 µg/kg.

11. Field Duplicate Precision

Field duplicate samples are reviewed to assess representativeness of the sample aliquot to the area sampled and the precision of the results relative to field sampling techniques.

Review analytical results for the duplicate sample analyses.

Action: If field duplicate precision exceeded 30% RPD for aqueous samples or 50% RPD for sediment or biota samples for any compound, estimate (J and UJ) positive and non-detect results for the affected compounds in both samples. If severe imprecision was noted in the field duplicate sample (i.e., RPD >100%), qualify the remainder of the associated field sample data based on sound technical judgment.

Comments:

Field Duplicate Samples: SD-5 SD-5 Dup

Results for Pesticides + PCBs in both samples were all non-detect => can not assess field duplicate precision based on these results.

12. Additional QA/QC Issues

Were the percent solids for the samples >30%. Yes / No / NA.

List any additional issues which may affect the quality of the results. List the affected samples, QA/QC issue, and necessary actions taken in the comments section below.

Action: If the %solids were between 10% and 30%, qualify positive results as estimated (J) and reject non-detected results (R). If the %solids were < 10%, reject (R) positive and non-detected results.

Positive
- Results qualified as "P" or "I" checked (analytes for which the RPD between Column A + B > 40%) - ~~If~~ Technical judgment will be used to either accept result as reported or to qualify result as estimated (J) Lab generally chose highest value to report results unless Interference was severe. RPD ≤ 50% used as benchmark (~~us~~ Sample/Dup Soil RPD criteria) -
- SD-2 4,4'-DDD Qualified P - highest Result chosen. RPD = 46% - Result reported = highest value. Result accepted with qualification. ✓

*Action - Sample SD-6 - Sample run at 1/10 Dilution. Result for gamma-Chlordane + 4,4'-DDD qualified P since RPDs > 50%. Result chosen was the highest value - Based on Technical judgment since the RPDs > 50% (51 + 55%) the results for gamma-Chlordane and 4,4'-DDD have been qualified as estimated (J) and may be biased high.

Date Sampled in DB file incorrect for SD-2, SD-01, SD-10, SD-11, SD-5, SD-5DUP, SD-9 + SD-8 - Amended during this evaluation.

For Sample SD-7, the electronic file incorrectly reported the 4,4'-DDE result as Dieldrin - during assessment this mistake was corrected

Additional Notes:

SD-03 and SD-03E (DF=1 + DF=10) analyses provided since α-chlordane, 4,4'-DDE + 4,4'-DDD over calibration range on DF=1 analysis. During this assessment, the results for all DF=1 results accepted except for α-chlordane + 4,4'-DDE + 4,4'-DDD which evaluated the DF=10 values. In the database, the results for SD-03 have been modified to report the data in this same manner (i.e. single DB result for SD-03).

SD-01 and SD-01E (DF=1 + DF=25) - 4,4'-DDE, 4,4'-DDD + 4,4'-DDT over calibration range on DF=1 run. Results from DF=1 analysis accepted for all but these three compounds. The DF=25 run used to report DDD, DDE + DDT in Database. In addition α-chlordane detected in DF=25 run - not seen in DF=1 run due to interferences ⇒ α-chlordane from DF=25 associated with the SD-01 Result.
During the review of the data it was determined that the lab mis-reported the 4,4'-DDE result for SD-01E. A resubmittal request (see page 3B) was issued to have the lab re-report the data (rec'd 10/28/99)

During the review of the electronic data for sample SD-02, it was noticed that the lab incorrectly reported the result for 4,4'-DDD. A resubmittal request (see page 3C) was issued to have the lab revise the data sheet (received 10/28/99).

IVC. Example Sample Calculations

Review of one sample per data package is performed to determine if sample results and quantitation limits were correctly calculated and reported.

Sample ID: SD-01 was selected for review in this data package.

A. Form 1 Review

1. Were the Form 1s for completed according to the method/QAPP requirements? Yes / No. If no, list below the affected fields.

2. Reproduce the reporting limit for Pesticides/PCBs in one of the samples, did the laboratory correctly calculate the quantitation limits? Yes / No. If no, list below.

RL = $5 \times \frac{4}{30.19 \times .87} = 0.76$ µg/kg ✓

D. Quantitation Review

Reproduce a calculation for one pesticide/PCB analyte in one of the samples that contained a positive result and compare the calculated result to the result reported by the laboratory.

Analyte Checked: SD-01E ~~D;Nal~~ 4,4'-DDD - Column B

Laboratory Result: 200 µg/kg Calculated Result: 200 µg/kg ✓

Example Calculation: Since curves used, process like that used for ICAL + CCAL used to verify that correct ICAL used.

Column B Amt. Found = 51.8788 Area (True) = 118088 ✓

IS Area = 179065 @ 50 ppb

ICAL 4,4'-DDD - $y = (0.002111) + (0.647087)x + (-0.013045)x^2$

$x = \frac{51.8788}{50} = 1.0376 \Rightarrow y = 0.6595 \Rightarrow$ Calc. Area = 118089 ✓

∴ Data system Calc. Amt. was determined using correct ICAL

$\text{Conc} = \text{Amt. Calc} \times \frac{\text{DF} \times \text{Final Volume}}{\text{Weight (solid) extracted}}$

DF = 25 ; Volume final = 4 mL ; weight extracted = 30.19 g × 0.87

$\therefore \text{Conc} = 51.8788 \times \frac{25 \times 4}{(30.19)(.87)} = 197.5$

= 200 µg/kg ✓

NCR for NEH, 11/26/99
r[illegible] at NEH, Inc 12/7/99

Industri-Plex, Woburn, MA
Organic Sedi(Data

Draft DV.

Description:	SD-5DUP			SD-9			SD-8			SD-7			SD-6		
Lab_ID:	42563-4			42563-6			42563-8			42563-11			42563-13		
Date:	06/22/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV	06/23/99	Lab	DV	06/23/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
As received %solids:	9.99%		Bias	7.19%			17.04%			10.29%			18.36%		
Analyte Compound	Field Duplicate		H=												
Volatile Organic Analysis (VOC) Method 8260B			high												
Chloromethane	16	U	UJ	24	U	UJ	19	U	UJ	17	U	UJ	6	U	UJ
Vinyl chloride	16	U	U	24	U	U	19	U	U	17	U	UJ	6	U	UJ
Bromomethane	16	U	U	24	U	U	19	U	U	17	U	UJ	6	U	UJ
Chloroethane	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Acetone	2100	E	TB J	High 470		TB	1400		TB	150		TB	31		JTB
1,1-Dichloroethene	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Carbon disulfide	56		J H	24	U	U	13	J	J	20			17		
Methylene chloride	40	U	U	59	U	U	47	U	U	44	U	UJ	16	U	UJ
trans-1,2-Dichloroethene	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
1,1-Dichloroethane	16	U	U	24	U	U	19	U	U	45			27		
2-Butanone (MEK)	490		J H	24	U	U	340			17	U	U	6	U	U
cis-1,2-Dichloroethene	17		J	24	U	U	19	U	U	10	J	J	18		
Chloroform	16	J	U	24	U	U	19	U	U	17	U	U	6	U	U
1,1,1-Trichloroethane	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Carbon tetrachloride	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Benzene	48000	E	J H	41			9	J	J	9	J	J	6	U	U
1,2-Dichloroethane	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Trichloroethene	10	J	J H	24	U	U	19	U	U	17	U	U	11		
1,2-Dichloropropane	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Bromodichloromethane	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Methyl isobutyl ketone (MIBK)	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
cis-1,3-Dichloropropene	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Toluene	45		J H	24	U	U	19	U	U	17	U	U	6	U	U
trans-1,3-Dichloropropene	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
1,1,2-Trichloroethane	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
2-Hexanone	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Tetrachloroethene	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Dibromochloromethane	16	U	U	24	U	U	19	U	U	17	U	U	6	U	U
Chlorobenzene	15	J	J H	24	U	U	19	U	U	17	U	U	6	U	UJ
Ethylbenzene	280		J H	24	U	U	19	U	U	17	U	U	6	U	UJ
p/m-Xylene	1400		J H	47	U	U	37	U	U	35	U	U	13	U	UJ
o-Xylene	220		J H	24	U	U	19	U	U	17	U	U	6	U	UJ
Styrene	16	U	U	24	U	U	19	U	U	17	U	U	6	U	UJ
Bromoform	16	U	U	24	U	U	19	U	U	17	U	U	6	U	UJ
1,1,2,2-Tetrachloroethane	16	U	U	24	U	U	19	U	U	17	U	U	6	U	UJ

Industri-Plex, Woburn, MA
Organic Sediment Data

Draft DV 10/26/99

Description:	SD-04			SD-12			SD-13			Trip Blank			SD-03			
Lab_ID:	42537-2			42537-5			42537-7			42537-8			42541-2			
Date:	06/17/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV	06/18/99	Lab	DV	
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	
As received %solids:	13.23%		Bias	13.76%			27.04%		Bias	~~0.00%~~ NA			23.74%		Bias	
Analyte			H=high						L=Low						L=	low
Volatile Organic Analysis (VOC) Method 8260B																
Chloromethane	13	U	U	17	U	UJ	6	U	UJ Low	2	U	U	7	U	UJ	L
Vinyl chloride	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Bromomethane	13	U	UJ	84	U	UJ	31	U	UJ L	2	U	UJ	36	U	UJ	
Chloroethane	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Acetone	34	U	UJ	670		TB	290		JTB	4	J	J	210		JTB	
1,1-Dichloroethene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	L
Carbon disulfide	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Methylene chloride	34	JB	UJ	42	JB	U	15	JB	UJ L	5	U	UJ	7	JB	UJ	
trans-1,2-Dichloroethene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
1,1-Dichloroethane	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
2-Butanone (MEK)	13	U	U	230			89		J L	2	U	U	60		J	
cis-1,2-Dichloroethene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Chloroform	34	JB	U	42	U	U	15	U	UJ L	1	J	J	18	U	UJ	
1,1,1-Trichloroethane	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Carbon tetrachloride	34	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Benzene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
1,2-Dichloroethane	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Trichloroethene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
1,2-Dichloropropane	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Bromodichloromethane	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Methyl isobutyl ketone (MIBK)	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
cis-1,3-Dichloropropene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Toluene	34	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
trans-1,3-Dichloropropene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
1,1,2-Trichloroethane	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
2-Hexanone	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Tetrachloroethene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Dibromochloromethane	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Chlorobenzene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Ethylbenzene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
p/m-Xylene	27	U	U	34	U	U	12	U	UJ L	4	U	U	15	U	UJ	
o-Xylene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Styrene	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
Bromoform	13	U	U	17	U	U	6	U	UJ L	2	U	U	7	U	UJ	
1,1,2,2-Tetrachloroe[illegible]	13	U	U	17	U	[illegible]	6	U	UJ L	2	U	U	7	U	[illegible]	

Draft DV 10/1-/99

Organic Sedir Data

Description:	SD-2 (SD-02)			SD-01			SD-10			SD-11			SD-5 (SD-05)		
Lab_ID:	42562-2			42562-5			42562-7			42562-9			42563-2		
Date:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
As received %solids:	8.79%			23.80%			22.47%			14.68%			10.98%		Bias
Analyte															H = High
Volatile Organic Analysis (VOC) Method 8260B															
Chloromethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	UJ
Vinyl chloride	25	U	U	10	U	U	10	U	U	14	U	U	17	J	J H
Bromomethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Chloroethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Acetone	2200		TB	120		TB	58		TB	230		TB	2400	E	TB J H
1,1-Dichloroethene	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Carbon disulfide	25	U	U	10	U	U	10	U	U	14	U	U	63		J H
Methylene chloride	63	U	U	24	U	U	24	U	U	34	U	U	44	U	U
trans-1,2-Dichloroethene	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
1,1-Dichloroethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
2-Butanone (MEK)	680			10	U	U	10	U	U	14	U	U	540		J H
cis-1,2-Dichloroethene	25	U	U	10	U	U	10	U	U	14	U	U	54		J H
Chloroform	25	U	U	10	U	U	10	U	U	14	U	U	18	JB	U
1,1,1-Trichloroethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Carbon tetrachloride	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Benzene	25	U	U	10	U	U	10	U	U	14	U	U	43000	E	J
1,2-Dichloroethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Trichloroethene	25	U	U	10	U	U	10	U	U	14	U	U	22		J H
1,2-Dichloropropane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Bromodichloromethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Methyl isobutyl ketone (MIBK)	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
cis-1,3-Dichloropropene	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Toluene	25	U	U	10	U	U	10	U	U	14	U	U	140		J H
trans-1,3-Dichloropropene	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
1,1,2-Trichloroethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
2-Hexanone	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Tetrachloroethene	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Dibromochloromethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Chlorobenzene	25	U	U	10	U	U	10	U	U	14	U	U	37		J H
Ethylbenzene	25	U	U	10	U	U	10	U	U	14	U	U	710		J H
p/m-Xylene	50	U	U	19	U	U	19	U	U	27	U	U	3400		J H
o-Xylene	25	U	U	10	U	U	10	U	U	14	U	U	370		J H
Styrene	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
Bromoform	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U
1,1,2,2-Tetrachloroethane	25	U	U	10	U	U	10	U	U	14	U	U	18	U	U

✓ NCR for NETH, Inc. 10/26/99
✓ QC at NEH, Inc 12/8/99

Industri-Plex, Woburn, MA
Organic Sediment Data

Draft DV 10/26/99

Description:	SD-04			SD-12			SD-13			SD-03		
Lab_ID:	42537-1			42537-4			42537-6			42541-1		
Date:	06/17/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV	06/18/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
Freeze-dried %solids:	66.97%			83.57%			79.08%			77.74%		
Analyte Compounds												
Semi-Volatile Organic Analysis (SVOCs) 8270C												
bis(2-Chloroethyl)ether	400	U	U	320	U	U	330	U	U	340	U	U
Phenol	400	U	U	320	U	U	330	U	U	340	U	U
2-Chlorophenol	400	U	U	320	U	U	330	U	U	340	U	U
1,3-Dichlorobenzene	400	U	U	320	U	U	330	U	U	340	U	U
1,4-Dichlorobenzene	400	U	U	320	U	U	330	U	U	340	U	U
1,2-Dichlorobenzene	400	U	U	320	U	U	330	U	U	340	U	U
bis(2-chloroisopropyl)ether	400	U	UJ	320	U	UJ	330	U	UJ	340	U	UJ
Hexachloroethane	400	U	U	320	U	U	330	U	U	340	U	U
N-Nitroso-di-n-propylamine	400	U	UJ	320	U	UJ	330	U	UJ	340	U	UJ
Nitrobenzene	400	U	U	320	U	U	330	U	U	340	U	U
Isophorone	400	U	U	320	U	U	330	U	U	340	U	U
2-Nitrophenol	400	U	U	320	U	U	330	U	U	340	U	U
2,4-Dimethylphenol	400	U	U	320	U	U	330	U	U	340	U	U
bis(2-Chloroethoxy)methane	400	U	U	320	U	U	330	U	U	340	U	U
2,4-Dichlorophenol	400	U	U	320	U	U	330	U	U	340	U	U
1,2,4-Trichlorobenzene	400	U	U	320	U	U	330	U	U	340	U	U
Naphthalene	110	J	J	160	J	J	90	J	J	160	J	J
Hexachlorobutadiene	400	U	U	320	U	U	330	U	U	340	U	U
4-Chloro-3-methylphenol	400	U	U	320	U	U	330	U	U	340	U	U
Hexachlorocyclopentadiene	990	U	UJ	790	U	UJ	840	U	UJ	850	U	UJ
2,4,6-Trichlorophenol	400	U	U	320	U	U	330	U	U	340	U	U
2-Chloronaphthalene	400	U	U	320	U	U	330	U	U	340	U	U
Acenaphthylene	200	J	J	190	J	J	110	J	J	390		
Dimethylphthalate	400	U	U	320	U	U	330	U	U	340	U	U
2,6-Dinitrotoluene	400	U	U	320	U	U	330	U	U	340	U	U
Acenaphthene	400	U	U	81	J	J	100	J	J	110	J	J
2,4-Dinitrophenol	990	U	UJ	790	U	UJ	840	U	UJ	850	U	UJ
2,4-Dinitrotoluene	400	U	U	320	U	U	330	U	U	340	U	U
4-Nitrophenol	990	U	UJ	790	U	UJ	840	U	UJ	850	U	UJ
Fluorene	160	J	J	190	J	J	120	J	J	210	J	J
4-Chlorophenyl-phenylether	400	U	U	320	U	U	330	U	U	340	U	U
Diethylphthalate	400	U	U	320	U	U	330	U	U	340	U	U
4,6-Dinitro-2-methylphenol	990	U	UJ	790	U	UJ	840	U	UJ	850	U	UJ
n-Nitrosodiphenylamine	400	U	U	320	U	U	330	U	U	340	U	U

Draft DV 1/26/99

Industri-Plex, Woburn, MA
Organic Sedi(Data

Description:	SD-04			SD-12			SD-13			SD-03		
Lab_ID:	42537-1			42537-4			42537-6			42541-1		
Date:	06/17/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV	06/18/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
Freeze-dried %solids:	66.97%		Bias	83.57%			79.08%			77.74%		
4-Bromophenyl-phenylether	400	U	U	320	U	U	330	U	U	340	U	U
Hexachlorobenzene	400	U	U	320	U	U	330	U	U	340	U	U
Pentachlorophenol	990	U	UJ low	790	U	UJ low	840	U	UJ low	850	U	UJ low
Phenanthrene	1600			1500			2000			3300		
Anthracene	320	J	J	380			330			440		
Di-n-butylphthalate	400	U	U	320	U	U	330	U	U	340	U	U
Fluoranthene	3700			3100			4700			6400	D	
Pyrene	3400			2900			4100			6100		
Butylbenzylphthalate	400	U	U	320	U	U	140	J	J	340	U	U
3,3'-Dichlorobenzidine	400	U	U	320	U	U	330	U	U	340	U	U
Benzo[a]anthracene	1500			1400			1700			2100		
Chrysene	2600			2100			3000			4400		
bis(2-Ethylhexyl)phthalate	180	J	J	100	J	J	580			1200		
Di-n-octylphthalate	400	U	U	320	U	U	330	U	U	340	U	U
Benzo[b]fluoranthene	3000			2100			3800			4900		
Benzo[k]fluoranthene	2200			2000			2300			3200		
Benzo[a]pyrene	2100			1900			2600			3300		
Indeno[1,2,3-cd]pyrene	1800			1400			2200			2400		
Dibenz[a,h]anthracene	350	J	J	320			530			530		
Benzo[g,h,i]perylene	1400			1100			1500			1700		
2-Methylphenol	400	U	U	320	U	U	330	U	U	340	U	U
4-Methylphenol	400	U	U	320	U	U	330	U	U	340	U	U
4-Chloroaniline	400	U	U	320	U	U	330	U	U	340	U	U
2-Methylnaphthalene	400	U	U	81	J	J	330	U	U	93	J	J
2,4,5-Trichlorophenol	990	U	U	790	U	U	840	U	U	850	U	U
2-Nitroaniline	990	U	U	790	U	U	840	U	U	850	U	U
3-Nitroaniline	400	U	U	320	U	U	330	U	U	340	U	U
Dibenzofuran	120	J	J	120	J	J	330	U	U	120	J	J
4-Nitroaniline	990	U	U	790	U	U	840	U	U	850	U	U
Carbazole	220	J	J	170	J	J	320	J	J	370		

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Industri-Plex, Woburn, MA
Organic Sediment Data

Description:	SD-2 SD-02			SD-01			SD-10			SD-11		
Lab_ID:	42562-1			42562-4			42562-6			42562-8		
Date:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
Freeze-dried %solids:	92.31%			86.99%			78.71%			81.27%		
Analyte												
Semi-Volatile Organic Analysis (SVOCs)												
bis(2-Chloroethyl)ether	1000	U	U	300	U	U	340	U	U	330	U	U
Phenol	1000	U	U	300	U	U	340	U	U	330	U	U
2-Chlorophenol	1000	U	U	300	U	U	340	U	U	330	U	U
1,3-Dichlorobenzene	1000	U	U	300	U	U	340	U	U	330	U	U
1,4-Dichlorobenzene	1000	U	U	300	U	U	340	U	U	330	U	U
1,2-Dichlorobenzene	1000	U	U	300	U	U	340	U	U	330	U	U
bis(2-chloroisopropyl)ether	1000	U	UJ	300	U	UJ	340	U	UJ	330	U	UJ
Hexachloroethane	1000	U	U	300	U	U	340	U	U	330	U	U
N-Nitroso-di-n-propylamine	1000	U	UJ	300	U	UJ	340	U	UJ	330	U	UJ
Nitrobenzene	1000	U	U	300	U	U	340	U	U	330	U	U
Isophorone	1000	U	U	300	U	U	340	U	U	330	U	U
2-Nitrophenol	1000	U	U	300	U	U	340	U	U	330	U	U
2,4-Dimethylphenol	1000	U	U	300	U	U	340	U	U	330	U	U
bis(2-Chloroethoxy)methane	1000	U	U	300	U	U	340	U	U	330	U	U
2,4-Dichlorophenol	1000	U	U	300	U	U	340	U	U	330	U	U
1,2,4-Trichlorobenzene	1000	U	U	300	U	U	340	U	U	330	U	U
Naphthalene	1000	U	U	300	U	U	340	U	U	120	J	J
Hexachlorobutadiene	1000	U	U	300	U	U	340	U	U	330	U	U
4-Chloro-3-methylphenol	1000	U	U	300	U	U	340	U	U	330	U	U
Hexachlorocyclopentadiene	2600	U	UJ	760	U	UJ	840	U	UJ	810	U	UJ
2,4,6-Trichlorophenol	1000	U	U	300	U	U	340	U	U	330	U	U
2-Chloronaphthalene	1000	U	U	300	U	U	340	U	U	330	U	U
Acenaphthylene	1000	U	U	150	J	J	340	U	U	98	J	J
Dimethylphthalate	1000	U	U	300	U	U	340	U	U	330	U	U
2,6-Dinitrotoluene	1000	U	U	300	U	U	340	U	U	330	U	U
Acenaphthene	1000	U	U	300	U	U	340	U	U	240	J	J
2,4-Dinitrophenol	2600	U	UJ	760	U	UJ	840	U	UJ	810	U	UJ
2,4-Dinitrotoluene	1000	U	U	300	U	U	340	U	U	330	U	U
4-Nitrophenol	2600	U	UJ	760	U	UJ	840	U	UJ	810	U	UJ
Fluorene	1000	U	U	300	U	U	340	U	U	370		
4-Chlorophenyl-phenylether	1000	U	U	300	U	U	340	U	U	330	U	U
Diethylphthalate	1000	U	U	300	U	U	340	U	U	460		
4,6-Dinitro-2-methylphenol	2600	U	UJ	760	U	UJ	840	U	UJ	810	U	UJ
n-Nitrosodiphenylamine	1000	U	U	300	U	U	100	J	J	170	J	J

Industri-Plex, Woburn, MA
Organic Sedi(Data

Draft DV 1/26/99

Description:	SD-2 SD-02			SD-01			SD-10			SD-11		
Lab_ID:	42562-1			42562-4			42562-6			42562-8		
Date:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
Freeze-dried %solids:	92.31%		bias	86.99%			78.71%			81.27%		
4-Bromophenyl-phenylether	1000	U	U	300	U	U	340	U	U	330	U	U
Hexachlorobenzene	1000	U	U	300	U	U	340	U	U	330	U	U
Pentachlorophenol	2600	U	UJ low	760	U	UJ low	840	U	UJ low	810	U	UJ low
Phenanthrene	1000	U	U	850			530			7000	D	
Anthracene	1000	U	U	150	J	J	340	U	U	590		
Di-n-butylphthalate	1000	U	U	300	U	U	340	U	U	330	U	U
Fluoranthene	1000	U	U	1500			1500			16000	D	
Pyrene	1000	U	U	1700			1300			14000	D	
Butylbenzylphthalate	1000	U	U	300	U	U	340	U	U	330	U	U
3,3'-Dichlorobenzidine	1000	U	U	300	U	U	340	U	U	330	U	U
Benzo[a]anthracene	1000	U	U	640			460			4000		
Chrysene	1000	U	U	1100			960			9900	D	
bis(2-Ethylhexyl)phthalate	1000	U	U	94	J	J	540			1100		
Di-n-octylphthalate	1000	U	U	300	U	U	340	U	U	330	U	U
Benzo[b]fluoranthene	1000	U	U	920			1100			10000	D	
Benzo[k]fluoranthene	1000	U	U	840			910			5900		
Benzo[a]pyrene	1000	U	U	810			690			7200	D	
Indeno[1,2,3-cd]pyrene	1000	U	U	530			560			4900		
Dibenz[a,h]anthracene	1000	U	U	110	J	J	110	J	J	1200		
Benzo[g,h,i]perylene	1000	U	U	500			480			3700		
2-Methylphenol	1000	U	U	300	U	U	340	U	U	330	U	U
4-Methylphenol	1000	U	U	190	J	J	340	U	U	330	U	U
4-Chloroaniline	1000	U	U	300	U	U	340	U	U	330	U	U
2-Methylnaphthalene	1000	U	U	300	U	U	340	U	U	330	U	U
2,4,5-Trichlorophenol	2600	U	U	760	U	U	840	U	U	810	U	U
2-Nitroaniline	2600	U	U	760	U	U	840	U	U	810	U	U
3-Nitroaniline	1000	U	U	300	U	U	340	U	U	330	U	U
Dibenzofuran	1000	U	U	300	U	U	340	U	U	240	J	J
4-Nitroaniline	2600	U	U	760	U	U	840	U	U	810	U	U
Carbazole	1000	U	U	300	U	U	340	U	U	970		

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Industri-Plex, Woburn, MA
Organic Sediment Data

Description:	SD-5 SD-05			SD-5 (Dup) SD-05DUP			SD-9 SD-09			SD-8 SD-08		
Lab_ID:	42563-1			42563-3			42563-5			42563-7		
Date:	06/22/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
Freeze-dried %solids:	97.31%			55.07%			41.72%			78.04%		
Analyte				Field Duplicate								
Semi-Volatile Organic Analysis (SVOCs)												
bis(2-Chloroethyl)ether	810	U	U	1900	U	U	640	U	U	340	U	U
Phenol	340	J	J	760	JD	J	640	U	U	120	J	J
2-Chlorophenol	810	U	U	1900	U	U	640	U	U	340	U	U
1,3-Dichlorobenzene	810	U	U	1900	U	U	640	U	U	340	U	U
1,4-Dichlorobenzene	810	U	U	1900	U	U	640	U	U	340	U	U
1,2-Dichlorobenzene	810	U	U	1900	U	U	640	U	U	340	U	U
bis(2-chloroisopropyl)ether	810	U	UJ	1900	U	UJ	640	U	UJ	340	U	UJ
Hexachloroethane	810	U	U	1900	U	U	640	U	U	340	U	U
N-Nitroso-di-n-propylamine	810	U	UJ	1900	U	UJ	640	U	UJ	340	U	UJ
Nitrobenzene	810	U	U	1900	U	U	640	U	U	340	U	U
Isophorone	810	U	U	1900	U	U	640	U	U	340	U	U
2-Nitrophenol	810	U	U	1900	U	U	640	U	U	340	U	U
2,4-Dimethylphenol	810	U	U	1900	U	U	640	U	U	340	U	U
bis(2-Chloroethoxy)methane	810	U	U	1900	U	U	640	U	U	340	U	U
2,4-Dichlorophenol	810	U	U	1900	U	U	640	U	U	340	U	U
1,2,4-Trichlorobenzene	810	U	U	1900	U	U	640	U	U	340	U	U
Naphthalene	550	J	J	1100	JD	J	640	U	U	190	J	J
Hexachlorobutadiene	810	U	U	1900	U	U	640	U	U	340	U	U
4-Chloro-3-methylphenol	810	U	U	1900	U	U	640	U	U	340	U	U
Hexachlorocyclopentadiene	2000	U	UJ	4800	U	UJ	1600	U	UJ	850	U	UJ
2,4,6-Trichlorophenol	810	U	U	1900	U	U	640	U	U	340	U	U
2-Chloronaphthalene	810	U	U	1900	U	U	640	U	U	340	U	U
Acenaphthylene	810	U	U	1900	U	U	640	U	U	340	U	U
Dimethylphthalate	810	U	U	1900	U	U	640	U	U	340	U	U
2,6-Dinitrotoluene	810	U	U	1900	U	U	640	U	U	340	U	U
Acenaphthene	390	J	J	1200	JD	J	640	U	U	130	J	J
2,4-Dinitrophenol	2000	U	UJ	4800	U	UJ	1600	U	UJ	850	U	UJ
2,4-Dinitrotoluene	810	U	U	1900	U	U	640	U	U	340	U	U
4-Nitrophenol	2000	U	UJ	4800	U	UJ	1600	U	UJ	850	U	UJ
Fluorene	680	J	J	2000	D	J	640	U	U	240	J	J
4-Chlorophenyl-phenylether	810	U	U	1900	U	U	640	U	U	340	U	U
Diethylphthalate	810	U	U	1900	U	U	640	U	U	340	U	U
4,6-Dinitro-2-methylphenol	2000	U	UJ	4800	U	UJ	1600	U	UJ	850	U	UJ
n-Nitrosodiphenylamine	810	U	U	1900	U	U	640	U	U	340	U	U

Industri-Plex, Woburn, MA
Organic Sedin Data

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Description:	SD-5 SD-05			SD-5 (Dup) SD-05DUP			SD-9 SD-09			SD-8 SD-08		
Lab_ID:	42563-1			42563-3			42563-5			42563-7		
Date:	06/22/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
Freeze-dried %solids:	97.31%		Bias	55.07%			41.72%			78.04%		
4-Bromophenyl-phenylether	810	U	U	1900	U	U	640	U	U	340	U	U
Hexachlorobenzene	810	U	U	1900	U	U	640	U	U	340	U	U
Pentachlorophenol	2000	U	UJ Low	4800	U	UJ Low	1600	U	UJ Low	850	U	UJ Low
Phenanthrene	5900		J	15000	D	J	760			2000		
Anthracene	640	J	J	1800	JD	J	640	U	U	220	J	J
Di-n-butylphthalate	810	U	U	1900	U	U	640	U	U	340	U	U
Fluoranthene	12000		J	26000	D	J	2300			3900		
Pyrene	7900		J	19000	D	J	1900			3000		
Butylbenzylphthalate	810	U	U	1900	U	U	640	U	U	340	U	U
3,3'-Dichlorobenzidine	810	U	U	1900	U	U	640	U	U	340	U	U
Benzo[a]anthracene	3100		J	6600	D	J	750			1100		
Chrysene	6500		J	14000	D	J	1500			2200		
bis(2-Ethylhexyl)phthalate	3700			4500	D		1500			1000		
Di-n-octylphthalate	810	U	U	1900	U	U	640	U	U	340	U	U
Benzo[b]fluoranthene	6400		J	14000	D	J	1500			2200		
Benzo[k]fluoranthene	5600		J	11000	D	J	1500			1800		
Benzo[a]pyrene	3700		J	9300	D	J	1100			1400		
Indeno[1,2,3-cd]pyrene	3100		J	7300	D	J	850			1200		
Dibenz[a,h]anthracene	670	J	J	1500	JD	J	180	J	J	220	J	J
Benzo[g,h,i]perylene	2300		J	5900	D	J	720			940		
2-Methylphenol	230	J	J	530	JD	J	640	U	U	340	U	U
4-Methylphenol	810	U	U	1900	U	U	640	U	U	340	U	U
4-Chloroaniline	810	U	U	1900	U	U	640	U	U	340	U	U
2-Methylnaphthalene	810	U	U	1900	U	U	640	U	U	340	U	U
2,4,5-Trichlorophenol	2000	U	U	4800	U	U	1600	U	U	850	U	U
2-Nitroaniline	2000	U	U	4800	U	U	1600	U	U	850	U	U
3-Nitroaniline	810	U	U	1900	U	U	640	U	U	340	U	U
Dibenzofuran	460	J	J	1200	JD	J	640	U	U	150	J	J
4-Nitroaniline	2000	U	U	4800	U	U	1600	U	U	850	U	U
Carbazole	1100		J	3100	D	J	640	U	U	400		

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Organic Sediment Data

Description:	(SD-7) SD-07			(SD-6) SD-06			
Lab_ID:	42563-10			42563-12			
Date:	06/23/99	Lab	DV	06/23/99	Lab	DV	
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	
Freeze-dried %solids:	61.11%			87.68%			
Analyte							
Semi-Volatile Organic Analysis (SVOCs)							
bis(2-Chloroethyl)ether	430	U	U	300	U	U	
Phenol	430	U	U	300	U	U	
2-Chlorophenol	430	U	U	300	U	U	
1,3-Dichlorobenzene	430	U	U	300	U	U	
1,4-Dichlorobenzene	430	U	U	300	U	U	
1,2-Dichlorobenzene	430	U	U	300	U	U	
bis(2-chloroisopropyl)ether	430	U	UJ	300	U	UJ	
Hexachloroethane	430	U	U	300	U	U	
N-Nitroso-di-n-propylamine	430	U	UJ	300	U	UJ	
Nitrobenzene	430	U	U	300	U	U	
Isophorone	430	U	U	300	U	U	
2-Nitrophenol	430	U	U	300	U	U	
2,4-Dimethylphenol	430	U	U	300	U	U	
bis(2-Chloroethoxy)methane	430	U	U	300	U	U	
2,4-Dichlorophenol	430	U	U	300	U	U	
1,2,4-Trichlorobenzene	430	U	U	300	U	U	
Naphthalene	430	U	U	110	J	J	
Hexachlorobutadiene	430	U	U	300	U	U	
4-Chloro-3-methylphenol	430	U	U	300	U	U	
Hexachlorocyclopentadiene	1100	U	UJ	760	U	UJ	
2,4,6-Trichlorophenol	430	U	U	300	U	U	
2-Chloronaphthalene	430	U	U	300	U	U	
Acenaphthylene	430	U	U	80	J	J	
Dimethylphthalate	430	U	U	300	U	U	
2,6-Dinitrotoluene	430	U	U	300	U	U	
Acenaphthene	150	J	J	300	U	U	
2,4-Dinitrophenol	1100	U	UJ	760	U	UJ	
2,4-Dinitrotoluene	430	U	U	300	U	U	
4-Nitrophenol	1100	U	UJ	760	U	UJ	
Fluorene	330	J	J	300	U	U	
4-Chlorophenyl-phenylether	430	U	U	300	U	U	
Diethylphthalate	110	J	J	300	U	U	
4,6-Dinitro-2-methylphenol	1100	U	UJ	760	U	UJ	
n-Nitrosodiphenylamine	150	J	J	150	J	J	

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Industri-Plex, Woburn, MA
Organic Sedi[illegible] Data

Description:	SD-7 SD-07			SD-6 SD-06		
Lab_ID:	42563-10			42563-12		
Date:	06/23/99	Lab	DV	06/23/99	Lab	DV
Units:	µg/Kg	Qual.	Qual.	µg/Kg	Qual.	Qual.
Freeze-dried %solids:	61.11% dry wt		Bias	87.68% dry wt		
4-Bromophenyl-phenylether	430	U	U	300	U	U
Hexachlorobenzene	430	U	U	300	U	U
Pentachlorophenol	1100	U	UJ LOX	760	U	UJ LOX
Phenanthrene	4100			1000		
Anthracene	410	J	J	260	J	J
Di-n-butylphthalate	430	U	U	300	U	U
Fluoranthene	8300	D		3400		
Pyrene	6500			2600		
Butylbenzylphthalate	430	U	U	300	U	U
3,3'-Dichlorobenzidine	430	U	U	300	U	U
Benzo[a]anthracene	2200			1300		
Chrysene	4900			1800		
bis(2-Ethylhexyl)phthalate	2600			37000	D	
Di-n-octylphthalate	430	U	U	300	U	U
Benzo[b]fluoranthene	5500			2100		
Benzo[k]fluoranthene	3400			1700		
Benzo[a]pyrene	3000			1400		
Indeno[1,2,3-cd]pyrene	2400			940		
Dibenz[a,h]anthracene	470			210	J	J
Benzo[g,h,i]perylene	1700			760		
2-Methylphenol	430	U	U	300	U	U
4-Methylphenol	430	U	U	300	U	U
4-Chloroaniline	430	U	U	300	U	U
2-Methylnaphthalene	430	U	U	300	U	U
2,4,5-Trichlorophenol	1100	U	U	760	U	U
2-Nitroaniline	1100	U	U	760	U	U
3-Nitroaniline	430	U	U	300	U	U
Dibenzofuran	170	J	J	300	U	U
4-Nitroaniline	1100	U	U	760	U	U
Carbazole	670			160	J	J

NCR for NEH, Inc. 10/25/99
✓ [illegible] at NEH, Inc 12/7/99

Draft DV 10/26/99

Industri-Plex, Woburn, MA
Organic Sediment Data

Description:	SD-04			SD-12			SD-13			SD-03			(SD-2) SD-02		
Lab_ID:	42537-1			42537-4			42537-6			42541-1			42562-1		
Date:	06/17/99	Lab	DV	06/17/99	Lab	DV	06/17/99	Lab	DV	06/18/99	Lab	DV	06/21/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
Freeze-dried %solids:	66.97% ✓			83.57% ✓			79.08% ✓			77.74% ✓		Bias	92.31% ✓		
Analyte															
Pesticides/ PCBs Post 8081A + 8082															
Alpha-BHC	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
Gamma-BHC	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	UJ	2.6	U	U
Beta-BHC	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
Delta-BHC	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
Heptachlor	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
Aldrin	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	UJ Low	2.6	U	U
Heptachlor Epoxide	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
Gamma Chlordane	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
Alpha Chlordane	0.99	U	U	0.79	U	U	0.84	U	U	69	E	J High	2.6	U	U
Endosulfan I	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
4,4'-DDE	0.99	U	U	0.79	U	U	17			43	E		13		
Dieldrin	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
Endrin	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	UJ Low	2.6	U	U
4,4'-DDD	27			8.0			22			97	E		25	P	
Endosulfan II	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
4,4'-DDT	0.99	U	U	0.79	U	U	13			26		J High	2.6	U	U
Endosulfan Sulfate	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
Methoxychlor	4.9	U	U	4.0	U	U	4.2	U	U	4.2	U	U	13	U	U
Endrin Ketone	0.99	U	U	0.79	U	U	0.84	U	U	0.85	U	U	2.6	U	U
Toxaphene	9.9	U	U	7.9	U	U	8.4	U	U	8.5	U	U	26	U	U
Aroclor 1016	3.9	U	U	3.2	U	U	3.3	U	U	3.4	U	U	10.4	U	U
Aroclor 1221	3.9	U	U	3.2	U	U	3.3	U	U	3.4	U	U	10.4	U	U
Aroclor 1232	3.9	U	U	3.2	U	U	3.3	U	U	3.4	U	U	10.4	U	U
Aroclor 1242	3.9	U	U	3.2	U	U	3.3	U	U	3.4	U	U	10.4	U	U
Aroclor 1248	3.9	U	U	3.2	U	U	3.3	U	U	3.4	U	U	10.4	U	U
Aroclor 1254	3.9	U	U	3.2	U	U	3.3	U	U	3.4	U	U	10.4	U	U
Aroclor 1260	3.9	U	U	3.2	U	U	3.3	U	U	3.4	U	U	10.4	U	U

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Industri-Plex, Woburn, MA
Organic Sediment Data

Description:	SD-01			SD-10			SD-11			(SD-5) SD-05			(SD-5 (dup)) SD-05DUP		
Lab_ID:	42562-4			42562-6			42562-8			42563-1			42563-3		
Date:	06/21/99	Lab	DV	06/21/99	Lab	DV	06/21/99	Lab	DV	06/22/99	Lab	DV	06/22/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
Freeze-dried %solids:	86.99%			78.71%			81.27%			97.31%			55.07%		
Analyte			Bias										Field Duplicate		
Pesticides/ PCBs															
Alpha-BHC	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Gamma-BHC	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Beta-BHC	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Delta-BHC	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Heptachlor	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Aldrin	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Heptachlor Epoxide	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Gamma Chlordane	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Alpha Chlordane	23	U	J High	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Endosulfan I	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
4,4'-DDE	470	E		2.7			0.81	U	U	2.0	U	U	1.2	U	U
Dieldrin	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Endrin	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
4,4'-DDD	200	E		3.2			0.81	U	U	2.0	U	U	1.2	U	U
Endosulfan II	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
4,4'-DDT	180	E		0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Endosulfan Sulfate	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Methoxychlor	3.8	U	U	4.2	U	U	4.1	U	U	10	U	U	6.0	U	U
Endrin Ketone	0.76	U	U	0.84	U	U	0.81	U	U	2.0	U	U	1.2	U	U
Toxaphene	7.6	U	U	8.4	U	U	8.1	U	U	20	U	U	12	U	U
Aroclor 1016	3.0	U	U	3.4	U	U	3.3	U	U	8.1	U	U	4.8	U	U
Aroclor 1221	3.0	U	U	3.4	U	U	3.3	U	U	8.1	U	U	4.8	U	U
Aroclor 1232	3.0	U	U	3.4	U	U	3.3	U	U	8.1	U	U	4.8	U	U
Aroclor 1242	3.0	U	U	3.4	U	U	3.3	U	U	8.1	U	U	4.8	U	U
Aroclor 1248	3.0	U	U	3.4	U	U	3.3	U	U	8.1	U	U	4.8	U	U
Aroclor 1254	3.0	U	U	3.4	U	U	3.3	U	U	8.1	U	U	4.8	U	U
Aroclor 1260	3.0	U	U	3.4	U	U	3.3	U	U	8.1	U	U	4.8	U	U

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Industri-Plex, Woburn, MA
Organic Sediment Data

Description:	SD-9			SD-8			SD-7			SD-6		
Lab_ID:	42563-5			42563-7			42563-10			42563-12		
Date:	06/22/99	Lab	DV	06/22/99	Lab	DV	06/23/99	Lab	DV	06/23/99	Lab	DV
Units:	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.	µg/Kg dry wt	Qual.	Qual.
Freeze-dried %solids:	41.72%			78.04%			61.11%			87.66%		
Analyte												Bias
Pesticides/ PCBs												
Alpha-BHC	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Gamma-BHC	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Beta-BHC	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Delta-BHC	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Heptachlor	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Aldrin	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Heptachlor Epoxide	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Gamma Chlordane	1.6	U	U	0.85	U	U	1.1	U	U	93	P	J High
Alpha Chlordane	1.6	U	U	0.85	U	U	1.1	U	U	92		J High
Endosulfan I	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
4,4'-DDE	1.6	U	U	0.85	U	U	1.9	U	U	7.6	U	U
Dieldrin	1.6	U	U	0.85	U	U	1.1		U	7.6	U	U
Endrin	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
4,4'-DDD	1.6	U	U	0.85	U	U	1.1	U	U	22	P	J High
Endosulfan II	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
4,4'-DDT	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Endosulfan Sulfate	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Methoxychlor	8.0	U	U	4.3	U	U	5.4	U	U	38	U	UJ
Endrin Ketone	1.6	U	U	0.85	U	U	1.1	U	U	7.6	U	U
Toxaphene	16	U	U	8.5	U	U	11	U	U	76	U	U
Aroclor 1016	6.4	U	U	3.4	U	U	4.3	U	U	3.0	U	U
Aroclor 1221	6.4	U	U	3.4	U	U	4.3	U	U	3.0	U	U
Aroclor 1232	6.4	U	U	3.4	U	U	4.3	U	U	3.0	U	U
Aroclor 1242	6.4	U	U	3.4	U	U	4.3	U	U	3.0	U	U
Aroclor 1248	6.4	U	U	3.4	U	U	4.3	U	U	3.0	U	U
Aroclor 1254	6.4	U	U	3.4	U	U	4.3	U	U	3.0	U	U
Aroclor 1260	6.4	U	U	3.4	U	U	4.3	U	U	3.0	U	U

Data Usability Review
Organic Analysis by Modified Method 8270C
EPA Region I Tier II – type review

Client: Menzie-Cura & Associates, Inc.

Site: Industri-Plex, Woburn, Massachusetts

Laboratory: Woods Hole Group Environmental Laboratory, Raynham, MA

SDG: ETR 42693

# of samples/Analyses: 11 benthic invertebrates for Polynuclear Aromatic Hydrocarbon analysis

Initial Reviewer: Dr. Nancy C. Rothman, New Environmental Horizons, Inc. N. C. R

Senior Reviewer: Susan D. Chapnick, New Environmental Horizons, Inc. SD Chapnick

Date Completed: November 9, 1999

The Data Usability Review, representing a Region I Tier III-type validation, was performed on the data package. The intentions of this review are: 1) to determine if the data were generated and reported in accordance with SW-846 Methods 8260B, 8270C, 8081A, 8082, the *Toxicological Surface Water and Sediment Sampling and Fish Sampling Work Plan and Quality Assurance Project Plan for Industri-Plex Site, Woburn, Massachusetts, July 1999*, Region I, EPA-NE *Data Validation Functional Guidelines for Evaluating Environmental Analyses; Part II. Volatile/Semivolatile Data Validation Functional Guidelines*, 12/96 2), and the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, EPA540/R-94/012, February 1994; 2) to determine if the data met the program data quality objectives for acceptable accuracy, precision, and sensitivity; 3) to determine and define the technical usability of the data based on the accuracy, precision, and sensitivity QA/QC indicators; and 4) to update the project database with appropriate data quality qualifiers.

The Data Usability Review consists of five main sections. Section I is the Overall Summary of Data Usability including subsections addressing technical usability, accuracy, precision, and sensitivity of the data. Section II is the Data Package Completeness Review. Section III is the Review of the Laboratory Data Summary Forms and Additional QA/QC Parameters to determine if the QC requirements met and to determine the affect of exceeded QC requirements on the precision, accuracy, and sensitivity of the data. Section IV is the Review of the Overall Data Package to determine if contractual requirements were met. Section V is Example Sample Calculations to determine if the sample results and reporting limits were correctly calculated and reported by the laboratory.

I. Overall Summary of Data Usability

A. Summary of Technical Usability

All benthic invertebrate results for Polynuclear Aromatic Hydrocarbon (PAH) analysis included in the laboratory data package reviewed, identified by Woods Hole Group Environmental Laboratory (WHG) as project number (ETR) 42693 are usable for project objectives. Results have been estimated (J) or negated (U) for several compounds in all of the invertebrate samples due to quality control criteria exceedances. Data users should note the following uncertainties in the estimated results. The estimated and negated results are usable for project objectives.

B. Technical Issues Affecting Accuracy

Holding times, calibration criteria, surrogate recoveries, laboratory control sample recoveries, matrix spike/matrix spike duplicate recoveries, and other method-specific QC sample results were reviewed to evaluate the accuracy of the invertebrate results.

Surrogate recovery in one invertebrate sample was high, outside criteria for two of the four deuterated PAH surrogates added during extraction. The positive results reported for this sample were qualified as estimated (J) and may be biased high.

The Laboratory Control Sample (LCS) recovered all analytes within criteria. However, the laboratory also performed duplicate extraction and analysis of Standard Reference Material (SRM) 1974a, Organics in Mussel Tissue. Results from the duplicate SRMs indicated that naphthalene, phenanthrene, and anthracene were recovered high as compared to the SRM certified reference values. Consequently, all positive results for naphthalene, phenanthrene, and anthracene were qualified as estimated (J) and may be biased high. This action was taken on six of the samples reported.

All other quality control information, such as holding times and surrogate recoveries, associated with accuracy met QAPP and method criteria for the other results in these invertebrate samples.

C. Technical Issues Affecting Precision and Representativeness

The relative percent difference (RPD) between matrix spike and matrix spike duplicate results and between field duplicate pair results were evaluated to assess precision and representativeness of the invertebrate data.

Due to limited sample sizes available for extraction, it was not possible for the laboratory to perform a matrix spike (MS) and matrix spike duplicate (MSD) analysis or a laboratory duplicate analysis. The only duplicate analysis was performed on SRM 1974a. The precision between the duplicate SRMs, as measured by the Relative Percent Difference (RPD) between the recoveries in the QC samples, were below QAPP criteria of RPD ≤ 50% for all compounds except naphthalene (102% RPD), anthracene (78% RPD), and benzo(a)anthracene (59% RPD). Positive results for naphthalene, anthracene, and benzo(a)anthracene were qualified as estimated (J) due to the poor duplicate precision results observed in the SRM.

No field duplicate was associated with these samples; therefore, precision from the field through analysis could not be assessed.

D. Technical Issues Affecting Sensitivity

Blank contamination in method and field blanks, initial and continuing calibrations, and MDLs were reviewed to assess sensitivity of the results compared to QAPP reporting limits..

The QAPP required reporting limit (RL) for the PAHs was 1 µg/kg which would have been achieved had 2g of sample been extracted for analysis. Due to the limited sample size available for extraction, the laboratory was not able to achieve the 1 µg/kg reporting limit expected (sample sizes ranged from 0.2169g to 0.9559g). These reduced sample sizes lead to actual sample-specific reporting limits of between 2 and 9 µg/kg for the samples in this project. The actual reporting limits obtained are above some of the Human Health Risk Based Criteria (RBCs) for fish tissue; however, they were the best achievable limits for the matrices tested.

The method blank CT0729B2 reported naphthalene at 5 µg/kg. The Action level associated with this method blank was 25 µg/kg uncorrected for sample-specific extraction weights. Ten samples associated with this method blank reported results for naphthalene above the reporting limit but below the sample-specific blank action level. In these samples, the result for naphthalene was negated (U) and the level set at the concentration originally reported for the samples. Sample SD-3 O was the only sample which reported naphthalene that was not negated due to blank action. The negated results meet the Ecological and Human Health RBCs and are usable.

The method blank CT0729B2 reported 2-methylnaphthalene at 3 µg/kg. The Action level associated with this method blank was 15 µg/kg uncorrected for sample-specific extraction weights. Ten samples associated with this method blank reported results for 2-methylnaphthalene above the reporting limit but below the sample-specific blank action level. In these samples, the result for 2-methylnaphthalene was negated (U) and the level set at the concentration originally reported for the samples. The negated results meet the Ecological and Human Health RBCs and are usable.

The method blank CT0729B2 reported phenanthrene at 4 µg/kg. The Action level associated with this method blank was 20 µg/kg uncorrected for sample-specific extraction weights. Seven samples associated with this method blank reported results for phenanthrene above the reporting limit but below the sample-specific blank action level. In these samples, the result for phenanthrene was negated (U) and the level set at the concentration originally reported for the samples. The negated results meet the Ecological and Human Health RBCs and are usable. Samples SD-9 A&C, SD-11 C and SD-13 A&C reported results for phenanthrene which were above the sample-specific blank action level and were therefore reported as detected values.

E. Additional Technical and QA/QC Issues

A review of method compliance, an evaluation of method modifications, and other QA/QC issues were made to evaluate the comparability of the data generated for the project uses.

The laboratory followed the procedures outlined in their SOP *Analysis of Parent and Alkylated Polynuclear Aromatic Hydrocarbons and Selected Heterocyclic Compounds by Gas Chromatography/Mass Spectrometry with Selected Ion Monitoring (Revision 1).* The SRM data were evaluated by the lab after recovery correction was made to the results (adjusted based on the recovery of closely eluting deuterated surrogate compounds). This procedure is an option within the laboratory's SOP for certain reporting requirements; however, for the work on this project, this recovery correction was not appropriate. The sample data was checked and it was verified that recovery correction was not made when sample results were reported. Therefore, during assessment, the SRM data was recalculated without recovery correction and actions taken based on this assessment as outlined in Sections B and C.

F. Summary of Completeness, Documentation, and Chain-of-Custody Issues

All samples were received at the laboratory on July 2, 1999 with proper preservation (temperatures upon receipt were 4°± 2°C) and chain-of-custody documentation. Upon receipt, the invertebrates were immediately frozen until compositing and extraction could be performed on July 29, 1999.

Amphipods, Chironomids, and Odonats were obtained during the sampling process. For each station, the laboratory composited the Amphipods and Chironomids into a single sample (called A&C), as directed by Menzie Cura & Associates, prior to analysis. After compositing, samples SD-3 A&C and SD-10 A&C did not have sufficient biomass to allow analysis. Therefore, these samples were not analyzed for PAHs. Additionally, based on the chain-of-custody for benthic invertebrate sample collection, no benthic invertebrate samples were collected at stations SD-05 or SD-12.

The laboratory reported results for several analytes that were also detected in the method blank. The laboratory qualified these results with a "B" to indicate this fact. During assessment, these results were either negated (U) or accepted as discussed in Section D. The "B" qualifier was not associated with the final data usability qualification of results.

NEH generated a data summary table based on the project data file supplied by the laboratory including the corrections and qualifications added to the data based on this Data Usability Review. The data summary table of technically valid and usable results for the invertebrates reviewed by NEH is attached to this report.

Industri-Plex, Woburn, MA
Site and Reference Location - Organic Benthic Invertebrate Data

Validated 12/06/99
NEH, Inc.

Client Sample ID:	SD-01 A&C			SD-02 A&C			SD-02 O			SD-03 O			SD-04 A&C			SD-06 C		
Lab Sample ID:	42693-1			42693-2			42693-3			42693-5			42693-6			42693-7		
Matrix:	Tissue			Tissue			Tissue			Tissue			Tissue			Tissue		
Sample Date:	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV
Units	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.
ılyte - PAH																		
\ Method 8270C-SIM																		
hthalene	17	B	U	27	B	U	18	B	U	89	B	J	15	B	U	16	B	U
ethylnaphthalene	6	B	U	10	B	U	7	B	U	32	B	U	6	B	U	7	U	U
naphthylene	3	U	U	8	U	U	4	U	U	13			2			7	U	U
naphthene	3	U	U	8	U	U	4	U	U	6	U	U	2	U	U	7	U	U
rene	3	U	U	8	U	U	4	U	U	7			2	U	U	7	U	U
nanthrene	9	B	U	23	B	U	4	U	U	45	B	U	11	B	U	42	B	U
hracene	3	U	U	8	U	U	4	U	U	8		J	2	U	U	9		J
ranthene	8			13			4			28			12			65		
ene	8			9			4	U	U	21			10			48		
ızo[a]anthracene	4		J	8	U	U	4	U	U	15		J	4		J	22		J
ysene	5			8	U	U	4	U	U	12			6			25		
ızo[b]fluoranthene	3	U	U	8	U	U	4	U	U	8			4			27		
ızo[k]fluoranthene	3	U	U	8	U	U	4	U	U	7			2	U	U	8		
ızo[a]pyrene	3	U	U	8	U	U	4	U	U	8			2			15		
eno[1,2,3-cd]pyrene	3	U	U	8	U	U	4	U	U	8			3			15		
enz[a,h]anthracene	3	U	U	8	U	U	4	U	U	6	U	U	2	U	U	7	U	U
ızo[g,h,i]perylene	3	U	U	8	U	U	4	U	U	8			3			14		
y:																		
Amphipods																		
Chironomids																		
= Odonata																		
C = composite sample																		
ımphipods plus																		
ronomids																		

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at an estimated reporting limit.

Industri-Plex, Woburn, MA
Site and Reference Location - Organic Benthic Invertebrate Data

Validated 12/06/99
NEH, Inc.

Client Sample ID:	SD-07 A&C			SD-08 A&C			SD-09 A&C			SD-11 C			SD-13 A&C		
Lab Sample ID:	42693-8			42693-9			42693-10			42693-12			42693-13		
Matrix:	Tissue			Tissue			Tissue			Tissue			Tissue		
Sample Date:	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV
Units	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.
Analyte - PAH															
EPA Method 8270C-SIM															
Naphthalene	8	B	U	8	B	U	16	B	U	42	B	U	29	B	U
2-Methylnaphthalene	4	B	U	4	B	U	11	B	U	19	B	U	10	B	U
Acenaphthylene	2	U	U	3			3	U	U	9	U	U	6	U	U
Acenaphthene	3			3	U	U	3	U	U	28			22		
Fluorene	3			3	U	U	4		J	29			11		
Phenanthrene	12	B	U	14	B	U	28	B	J	180	B	J	80	B	J
Anthracene	2	U	U	3		J	3		J	23		J	13		J
Fluoranthene	14			22			44		J	450			90		
Pyrene	10			17			35		J	310			84		
Benzo[a]anthracene	3		J	7		J	9		J	59		J	28		J
Chrysene	4			12			12		J	130			39		
Benzo[b]fluoranthene	2			7			8		J	73			26		
Benzo[k]fluoranthene	2	U	U	4			4		J	19			7		
Benzo[a]pyrene	2	U	U	7			6		J	25			19		
Indeno[1,2,3-cd]pyrene	2	U	U	6			6		J	34			16		
Dibenz[a,h]anthracene	2	U	U	3	U	U	3	U	U	9	U	U	6	U	U
Benzo[g,h,i]perylene	2	U	U	6			5		J	34			17		

Key:
A = Amphipods
C = Chironomids
O = Odonats
A&C = composite sample of amphipods plus chironomids

U-Compound was non-detected. Associated value is sample-specific reporting limit. J-Result was estimated due to quality control exceedance. UJ-Compound was non-detected at an estimated reporting limit.

8270C
Data Review Checklist
For Region I Tier II-type Data Validation Summary

Lab: WHGEL
Date Sampled: 7/2/99
Method of Analysis: 8270C

Lab Project #: ETR 42693
No. Samples: 11
Matrix: Sediment / Water / Biota

	HT w (7d) other(14d)	Surrogate	LCS	MS	FD W:RPD≤30% Other:RPD≤50%	Accept. Blanks	RL & Quant. Correct	%Solids (>30%)
All Samples in Project	✓	✓	LCS OK	N/A	N/A	See pgs. 2-4	✓	N/A
Except:			SRM Action:					
SD-9 A+C		3 positive detects	See pg. 4					

Lab used their SOP - Analysis of Parent and Alkylated PAHs and Selected Heterocyclic Compounds by GC/MS with
Comments: SIM to report PAH data.
13 Sets of Samples sent to lab. Per Menzie Cura, Amphipods and Chironomids Composited (called A+C).
After compositing, Samples SD-3 (A+C) and SD-10 (A+C) did not have sufficient biomass for analysis (i.e. weight << 1 g) ⇒ Results for only 11 Samples reported.
Samples were received at 6°C and immediately frozen until extracting 7/29/99 - All analyzed 8/4-8/5/99

Date 11/8/99

Data Reviewer: [signature]

8270C
Data Review Checklist

Lab: WHGEL
Date Sampled: 7/2/99

Lab Project #: ETR 42693
No. Samples 11

Method of Analysis: 8270C
Associated Blanks: CT0729B2 (SBLK01)

Matrix: Sediment / Water / Biota

Blank ID	Contaminant / Level	Matrix Related?		Action Level / Action			Corrected Result
CT0729B2	Naphthalene 5ug/kg	Y		25ug/kg (Based on 1g ext.)		Samples SD-1A+C, SD-2 D, SD-4 A+C, SD-6C, SD-7A+C, SD-8 A+C + SD-9 A+C results >RL but < 25ug/kg	Naphthalene negated (U) at Level Reported
						Samples SD-2A+C, SD-11C + SD-13 A+C results >25ug/kg but using actual Sample weights extracted, these results were also >RL but < Sample-Specific AL	Naphthalene negated (U) at Level Reported

Blank Actions continued on page 3

8270C Action Summary:

HT Actions:
- Waters: 7d <HT≤ 14 d; J det/ J NDs; HT >14 d, J det/R ND
- Sediments: 14d <HT≤ 28 d, J det/ J NDs; HT >28 d, J det/R ND
- Biota: Stored up to 1 year frozen; 14d <HT≤ 28 d, J det/ J NDs; HT >28 d, J det/R ND
- Analysis: 40d < Extract HT ≤ 60d, J det/ J NDs; Extract HT > 60d; J det/ R NDs

Surrogate Actions: 2 BN or 2 Acids Recovery > Criteria, J det/Accept ND; 10% ≤ 2-All Surrogates < Criteria, J det/J NDs; Recovery < 10%, J det/R NDs. Action taken on Acid and/or BN analytes based on surrogates out.

Blank Actions: Surrogates outside criteria - Use Judgment if isolated or analysis related
Non-Matrix related Blank contamination, BB or EB contaminant in all samples associated with Blank
Matrix related Blank contamination: Result < RL, U result at RL; RL<Result<Blank Action, U result at level reported

MS Actions:
%Rec<10%, J det/ R NDs; 10% ≤%Rec<Criteria, J det/ J NDs; %Rec >Criteria, J det/Accept NDs for Unspiked Sample only

LCS Actions:
%Rec<10%, J det/ R NDs; 10% ≤%Rec<Criteria, J det/ J NDs; %Rec >Criteria, J det/Accept NDs for all Batch by Compound

FD Action: Both Conc. ≥ 2xRL, %RPD outside, J det; One result ND, other ≥2 x RL, J det/J NDs; Both Conc. < 2xRL; %RPD out, LCS OK, Accept data

%Solids Action: 10% ≤ % soilds ≤ 30%; J det/R ND; %solids < 10% R det/ R NDs

Date 11/8/99

Data Reviewer [signature]

Lab: WHGEL
Date Sampled: 7/2/99
Method of Analysis: 8270C

Lab Project #: ETR 42693
No. Samples 11
Matrix: Sediment / Water / Biota

Blank Action Continued

Blank ID	Contaminant / Level	Matrix Related?		Action Level / Action			Corrected Result
CT0729B2	2-methylnaphthalene at 3 ug/kg	Y		15 ug/kg (Based on 1 g extract)		SD-1 A&C, SD-2 A+C, SD-2 O, SD-4 A+C, SD-7 A&C, SD-8 A+C, SD-9 A+C and SD-13 A+C reported 2-methyl naphthalene > RL but < 15 ug/kg	2-methylnaphthalene result negated (u) at Level Reported
						Sample SD-3 O and SD-11C results > 15 ug/kg but using actual sample size for extraction, the results were > RL but < Sample-specific Action Level	2-methylnaphthalene result negated (u) at level Reported
CT0729B2	Phenanthrene at 4 ug/kg	Y		20 ug/kg (1 g ext.)		SD-1 A+C, SD-4 A+C, SD-7 A+C, SD-8 A+C results > RL but < 20 ug/kg	Phenanthrene negated (u) at Level Reported
						SD-2 A+C, SD-3 O; SD-6C results > RL but < sample-specific A.L	Phenanthrene negated (u) at Level Reported
						Samples SD-9 A+C, SD-11C and SD-13 A+C Phenanthrene results > Sample-specific Blank Action Level	No Action

Date 11/8/99

Data Review: [signature]

8270C
Data Review (klist

Lab: WHGEL
Date Sampled: 7/2/99
Method of Analysis: 8270C

Lab Project #: ETR 42693
No. Samples 11
Matrix: Sediment / Water / Biota

Additional Notes:

For Blank Action, the actual Sample weights extracted were used to judge whether action was required. For example, for Naphthalene in Sample SD-13 A+C, the weight extracted was 0.3568 g compared to the Blank at 1 g. Therefore the Sample-specific Blank Action level = 25 ug/kg × $\frac{1g}{0.3568g}$ = 70 ug/kg. Therefore, the reported result of 29 ug/kg was negated (U) at the level reported (i.e. 29 U)
- Sample SD-30 reported 89 ug/kg. The Sample-specific Action level for Naphthalene was 81 ug/kg therefore No Action was taken for this 1 Sample. The "B" qualifier added by the lab to the Sample data was eliminated in the DV qualifier for SD-30.

- For Samples SD-9A+C, SD-11C + SD-13 A+C, the Phenanthrene results reported were above the Sample specific Blank Action level so no action taken During Assessment. The "B" qualifier added to these Sample results was eliminated in the DV qualifiers.

- Surrogates for all samples except SD-9 A+C Acceptable. For S-9 A+C Phenanthrene-d10 133% Rec (35-125% criteria) and Chrysene-d12 132% Rec (40-130% criteria) => 2 out of 4 Surrogates recovered high above criteria. All positively detected results in Sample SD-9 A+C were qualified as estimated (J) due to high surrogate recovery - results may be biased high.

- LCS CT07294L2 · Recovery of all PAHs + Surrogates 73-98% - No Action Required.

- SRM 1974a (mussel tissue) also extracted + analyzed in duplicate (CT072951 + CT072952). In evaluating SRM1974a, lab recovery corrected results based on surrogate recoveries; however, this should not have been done with this data set (i.e. sample results were not recovery corrected). Duplicate SRM data indicate high % Rec of Naphthalene, Phenanthrene, Anthracene ~~and Benzo(a) anthracene~~ NA 11/9/99 compared to Certified Values => results for these analytes in Samples may be biased high. Action: Positive results for naphthalene, phenanthrene, anthracene (not previously negated) ~~and Benzo(a)anthracene~~ NA 11/9/99 have been qualified as estimated (J) - affects samples: SD3-0, ~~SD-1 A+C~~, ~~SD-4 A+C~~, SD-6C, ~~SD-7 A+C~~, SD-8 A+C, SD-11C + SD-13 A+C SD-9 A+C. (~~However~~ NOTE: several detected napthalene results were negated due to blank actions; therefore, high bias + estimation not ~~longer~~ applicable) ~~These included for Napthalene SD-~~ DC 12/6/99

Date 11/8/99

Data Reviewer [signature]

New Environmental Horizons, Inc.

Lab: WHGEL
Date Sampled: 7/2/99
Method of Analysis: 8270C

Lab Project #: ETR 42693
No. Samples 11
Matrix: Sediment / Water / Biota

Additional Notes:

No MS performed with Batch (not enough sample) - SRM 1974a done instead.

No Field Duplicate or Lab Duplicate with SDG => Precision not able to be assessed.

RL - Lowest ICAL standard at 10 ng/mL - Assuming 1 g extraction to 0.2 mL final volume the $RL = 10 \times \frac{0.2}{1} = 2$ ug/kg

- Sample-specific RLs properly reported. Sample weights extracted ranged from 0.2169 g to 0.9559 g => Reporting limits were raised from QAPP RLs of 1 ug/kg due to limited Sample size for Extraction. These RLs for the PAHs in these samples are higher than some of the Human-health RBCs for Fish Tissue; however, given the matrices, these were the best achievable limits for reporting.

SRM 1974a Precision - Recovery of the SRMs was recalculated without surrogate recovery correction. The RPD between the CT072951 and CT072952 Recoveries were < 50% for all analytes except Naphthalene (102% RPD), Anthracene (78.4% RPD) and Benzo(a)anthracene (59% RPD). Based on this imprecision, the results for Naphthalene, Anthracene and Benzo(a)anthracene were qualified as estimated (J).

Date 11/8/99

Data Reviewer: [signature]

√ NCR for NSI Inc. 11/8/99
√ AWC for NSI, Inc 12/6/99

Draft 11/8/99

Industri-Plex, Woburn, MA
Organic Benthic Invertebrate Data

	SD-01			SD-02			SD-02			SD-03			SD-04			SD-06		
Client Sample ID:	SD-1 A&C			SD-2 A&C			SD-2 O			SD-3 O			SD-4 A&C			SD-6 C		
Lab Sample ID:	42693-1			42693-2			42693-3			42693-5			42693-6			42693-7		
Matrix:	Tissue			Tissue			Tissue			Tissue			Tissue			Tissue		
Sample Date:	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV
Units	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.
Analyte																		
8270C-SIM																		
Naphthalene	17	B	U	27	B	U	18	B	U	89	B	J	15	B	U	16	B	U
2-Methylnaphthalene	6	B	U	10	B	U	7	B	U	32	B	U	6	B	U	7	U	U
Acenaphthylene	3	U	U	8	U	U	4	U	U	13			2			7	U	U
Acenaphthene	3	U	U	8	U	U	4	U	U	6	U	U	2	U	U	7	U	U
Fluorene	3	U	U	8	U	U	4	U	U	7			2	U	U	7	U	U
Phenanthrene	9	B	U	23	B	U	4	U	U	45	B	U	11	B	U	42	B	U
Anthracene	3	U	U	8	U	U	4	U	U	8		J	2	U	U	9		J
Fluoranthene	8			13			4			28			12			65		
Pyrene	8			9			4	U	U	21			10			48		
Benzo[a]anthracene	4		J	8	U	U	4	U	U	15		J	4		J	22		J
Chrysene	5			8	U	U	4	U	U	12			6			25		
Benzo[b]fluoranthene	3	U	U	8	U	U	4	U	U	8			4			27		
Benzo[k]fluoranthene	3	U	U	8	U	U	4	U	U	7			2	U	U	8		
Benzo[a]pyrene	3	U	U	8	U	U	4	U	U	8			2			15		
Indeno[1,2,3-cd]pyrene	3	U	U	8	U	U	4	U	U	8			3			15		
Dibenz[a,h]anthracene	3	U	U	8	U	U	4	U	U	6	U	U	2	U	U	7	U	U
Benzo[g,h,i]perylene	3	U	U	8	U	U	4	U	U	8			3			14		

Add Key

Draft
11/8/99

Industri-Plex, Woburn, MA
Organic Benthic Invertebrate Data

	SD-07			SD-08			SD-09			SD-11			SD-13		
Client Sample ID:	SD-7 A&C			SD-8 A&C			SD-9 A&C			SD-11 C			SD-13 A&C		
Lab Sample ID:	42693-8			42693-9			42693-10			42693-12			42693-13		
Matrix:	Tissue			Tissue			Tissue			Tissue			Tissue		
Sample Date:	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV	07/02/99	Lab	DV
Units	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.	µg/Kg wet	Qual.	Qual.
Analyte															
8270C-SIM															
Naphthalene	8	B	U	8	B	U	16	B	U	42	B	U	29	B	U
2-Methylnaphthalene	4	B	U	4	B	U	11	B	U	19	B	U	10	B	U
Acenaphthylene	2	U	U	3			3	U	U	9	U	U	6	U	U
Acenaphthene	3			3	U	U	3	U	U	28			22		
Fluorene	3			3	U	U	4		J	29			11		
Phenanthrene	12	B	U	14	B	U	28	B	J	180	B	J	80	B	J
Anthracene	2	U	U	3		J	3		J	23		J	13		J
Fluoranthene	14			22			44		J	450			90		
Pyrene	10			17			35		J	310			84		
Benzo[a]anthracene	3		J	7		J	9		J	59		J	28		J
Chrysene	4			12			12		J	130			39		
Benzo[b]fluoranthene	2			7			8		J	73			26		
Benzo[k]fluoranthene	2	U	U	4			4		J	19			7		
Benzo[a]pyrene	2	U	U	7			6		J	25			19		
Indeno[1,2,3-cd]pyrene	2	U	U	6			6		J	34			16		
Dibenz[a,h]anthracene	2	U	U	3	U	U	3	U	U	9	U	U	6	U	U
Benzo[g,h,i]perylene	2	U	U	6			5		J	34			17		

✓